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ABSTRACT

A study explored ways in which training in information technology could be included in Participation and Equity Programs (PEP) in the areas of hospitality/tourism, retailing, and business and finance. The research team conducted a literature search, obtained completed questionnaires from 10 colleges offering a total of 22 PEPs, visited an additional 6 PEPs, and observed 10 PEPs. Information was gathered about the 1985 level of provision of information technology training in PEPs in Australia and similar initiatives abroad, and a curriculum framework for providing information technology training to PEP participants and similar target groups was developed. Besides developing the present report, the project staff also published an annotated information technology resource guide for PEP teachers and a description of an overseas initiative that is applicable to Australia. The curriculum recommended as a result of the study consists of an information technology core and bridging information technology courses for selected industries and related mainstream study. The theory portion of such courses should cover basic information technology terminology and processes, basic computer hardware and software structure, the history of information technology, and information technology awareness. Practical topics to be addressed include keyboard skills, terminal and microcomputer operations, use of modems and software packages, and elementary programming. (Appendixes include a list of advisory committee members, the college and industry questionnaires and cover letters, and selected newspaper extracts. A select bibliography is also provided.) (MN)

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TAFE National Centre
for Research and Development

INFORMATION TECHNOLOGY CURRICULUM DEVELOPMENT FOR PARTICIPATION AND EQUITY PROGRAMS

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PREFACE

This report is one of the outcomes of a project conducted by the TAFE National Centre for Research and Development for the Youth Programs Branch of the Office of the TAFE Board of Victoria.

Other outcomes of the project are:

- a monograph entitled Information technology centres: An overseas initiative applicable in Australia
- a monograph entitled Annotated information technology resources for PEP teachers.

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CHAPTER ONE: DEFINITIONS, ABBREVIATIONS AND ACKNOWLEDGEMENTS

1.1 DEFINITIONS AND ABBREVIATIONS USED IN THIS DOCUMENT

Definitions

IT (information technology) is the acquisition, production, transformation, storage and transmission of data by electronic means in forms such as vocal, pictorial, textual or numeric, such as to facilitate the interaction between people and between people and machines. IT also includes the applications and implications (social, economic and cultural) of these processes. (Adapted from Further Education Unit, 1984, p. 1.)

PEP (Participation and Equity Program), is a program for the 15- to 24-year-old target group which aims:

- to encourage all young people to participate in education or training at schools or technical and further education institutions, or in other forms of education or training, until they have completed a full secondary education or its equivalent;
- to ensure that, as far as practicable, the education and training provided in schools and technical and further education institutions offer all young people equal opportunities to develop their individual talents and abilities, and thereby to ensure more equitable outcomes of education;

(TAFEC, 1984, p. 1.)

Curriculum framework is used in this document to mean a way in which IT content could be structured in a PEP. It takes into account the aims of PEP, the diversity of programs and the learning milieu which is (philosophically) based on the development of the participant as an individual.

Abbreviations

ATS	Australian Traineeship System
BTEC	Business and Technician Education Council
CAD	Computer aided design
CAI	Computer aided instruction
CAM	Computer aided manufacture
CGLI	City and Guilds of London Institute
CPVE	Certificate in pre-vocational education
DTI	Department of Trade and Industry
FEU	Further Education Unit
IT	Information Technology
ITeC	Information Technology Centre
Kirby Report	Report of the Committee of Inquiry into Labour Market Programs
MSC	Manpower Services Commission
OTB	Office of the TAFE Board
PEP	Participation and Equity Program
RSA	Royal Society of Arts
TAFE	Technical and Further Education
TAFEC	Technical and Further Education Council
YTS	Youth Training Scheme
YPB	Youth Programs Branch

1.2 ACKNOWLEDGEMENTS

The TAFE National Centre for Research and Development could not have conducted this project without the help of many individuals and groups. The Centre acknowledges the invaluable help of the members of the Advisory Committee, staff of the Youth Programs Branch, PEP program co-ordinators and staff who gave their time to complete the questionnaire and the program staff who participated in interviews with members of the project team. The Centre also wishes to thank those firms and organisations which took the time to respond to the industry questionnaire.

CHAPTER TWO: SUMMARY

2.1 OVERVIEW

The TAFE National Centre for Research and Development was commissioned by the Youth Programs Branch of the Office of the TAFE Board to suggest ways in which information technology (IT) content (including its social implications) could be included in participation and equity programs (PEP):

- in general
- in areas of hospitality/tourism, retailing and business/finance
- so that further study would be possible in IT-related TAFE courses.

Also, the study was to provide information about similar initiatives overseas.

The investigation used the following techniques:

- literature searches
- questionnaire
- interviews
- observations.

Three publications have resulted from this research project.

- Annotated information technology resources for PEP teachers.
- Information technology centres: an overseas initiative applicable to Australia.
- Information technology curriculum development for PEP (the present report).

The study identified the 1985 level of IT provision in PEPs, the level of use of IT for the nominated industries, and overseas initiatives to provide IT training for similar target groups.

This report describes the study and presents a curriculum framework for the provision of IT in PEPs. In developing the curriculum framework, the following factors have been recognised as extremely important:

- the overall aims of the PEP
- the diversity in programme aims and objectives
- the individual differences of participants' entry level knowledge and skills as well as their personal goals
- the age range of participants.

2.2 RECOMMENDATIONS

The recommendations included in the report are listed below.

Recommendation 1 (page 13)

A workshop for PEP teachers should be convened to facilitate the implementation of IT content in PEPs.

Recommendation 2 (page 13)

One agenda item for the workshop should be to design a mechanism whereby the form supplied in Appendix B can be used or adapted to develop a curriculum materials catalogue in the future.

Recommendation 3 (page 51)

That Information Technology Centres (ITeCs) should be established and that the main target group of such centres should be disadvantaged youths. Before establishing such centres, there should be a short urgent study to make specific recommendations on:

- funding;
- location;
- types of program to be offered (particularly PEPs);
- links with the local community, industry and educational institutions;
- administrative arrangements;
- provision of ITeCs in country areas, including the possibility of mobile ITeCs.

Recommendation 4 (page 70)

It is recommended that all PEP programs offer a program of study that introduces participants to the nature and workings of IT.

There are four key goals that PEP programs should be aiming for:

1. Programs should be seeking to establish effective instructional sessions that will produce computer literacy.
2. Programs must provide the facilities, resources, and personnel to support these instructional sessions.
3. Programs should strive to use effectively and manage the IT resources they have available to them.
4. Programs should ensure that teaching staff are computer literate.

Recommendation 5 (page 73)

That all PEPs should include some teaching about the social implications arising from the impact of IT. In-service training of teachers in both the process and the content of IT courses will be required.

Recommendation 6 (page 89)

It is recommended that all vocationally orientated PEPs include a core curriculum in IT as outlined.

Recommendation 7 (page 92)

It is recommended that the bridging courses in IT (as outlined) form the basis of programs preparing for employment in the three industry areas of hospitality and tourism, retail, and business and finance.

Recommendation 8 (page 99)

It is recommended that a seeding program be established to train one member of staff in each TAFE College running PEPs in IT, and that this person become responsible for disseminating his/her newly acquired skills among PEP staff. Every effort should be made to ensure that before training this 'seed person' be non-technical and non-literate in the Information Technologies.

Recommendation 9 (page 102)

It is recommended that some IT materials, at a level appropriate for PEPs, be developed. Further, that if IT curricula for PEP is introduced on a statewide basis in Victoria, it is recommended that specific curriculum materials be developed for such curricula, with priority given to the IT core curriculum.

CHAPTER THREE: INTRODUCTION

3.1 CONTEXT OF THE PROJECT

This project is one of nine proposed in the TAFE Board Submission to the TAFE Council: Participation and Equity Program 1986 in Attachment 6, Research Briefs.

The rationale presented in that document for the research was that:

> Both Peter Kirby's Enquiry into Labour Market Programs and the OECD enquiry into Australian Youth Policy emphasise the importance of information technology in the restructuring of the Australian workplace and of the necessity to equip the future workforce with the knowledge, attitudes and skills likely to thrive in this changing environment. While the Commonwealth Government is implementing a 'computers in schools' program, the unemployed in the 15-to 24-year-old age group will not benefit from this program and are in danger of 'missing out' on training vital to their future work prospects.
>
> TAFE PEP thus proposes the development of a curriculum, suitable for PEP participants, that will identify basic knowledge and competencies required for 'literacy' in this area (involving the integration of computer telecommunication and satellite technologies) and which will result in the preparation of a curriculum framework.
>
> An important thrust of the curriculum, however, will be to focus not only upon skill competencies but also upon the social impact of the new technologies in order to assist PEP participants to reflect upon both individual and societal relationships to telematic technology.

The TAFE National Centre was commissioned in July 1985 by the Youth Programs Branch (YPB) (formerly the Participation and Equity Program Branch) of the Office of the TAFE Board (OTB) of Victoria to undertake this study. The research timetable was September 1985 to 28 February 1986.

3.2 TERMS OF REFERENCE

In order to undertake the project, the TAFE National Centre agreed to formulate a program of activities which included the following elements as listed in the research brief supplied by the YPB:

a) publications relating to the field of information technology;

b) the development of an appropriate curriculum which takes account of the need for practical experience as a tool for introducing people to the nature and workings of information technology;

c) the development of appropriate bridging courses to enable students to progress from computer-related skills areas, e.g. keyboarding, to courses associated with information technology;

d) various ways of introducing PEP participants to the social impact and history of information technology;

e) the merits and drawbacks of overseas initiatives (such as the ITeC program in the U.K.) targeted at disadvantaged groups and designed to assist such groups overcome their disadvantage through the development of skills in the field of information technology;

f) consideration of the need for information technology skills in the areas of hospitality and tourism, retailing, finance and business industries, and how curriculum needs might be addressed within existing TAFE PEP courses in these areas;

g) an interim report was expected after three months and the final report was to be completed by 28 February 1986.

3.3 PROPOSED PROJECT REPORT

Given the terms of reference, it was anticipated that the project report would contain the following components:

- a summary of what is already being done in colleges; critical analysis;
- a summary of what is available in the U.K.; critical analysis;

- a summary of requirements of selected business and industries;
- suggestions on how information technology could be integrated into existing syllabuses; suggestions for bridging courses;
- suggestions for an information technology course as a part of PEP's;
- recommendations;
- bibliography.

3.4 OUTCOMES OF THE PROJECT

As a result of the initial work by the research officers and discussions with the advisory committee, it was agreed that the project should produce several outcomes and not just a report.

It was therefore decided that the project team would work towards the outcomes discussed below.

Annotated bibliography for teachers

This would be an annotation of recommended further reading and references for PEP staff.

Report

As well as reporting on the activities of the project team and proposing recommendations, it was decided that the report should contain a description of an information technology curriculum framework. The framework was to be presented in such a way as to provide a useful teaching/learning resource for classroom practitioners together with the outline of possible syllabus content for nominated industries. It would include a discussion of issues related to learning environment, teaching approach and equipment requirements.

Monograph

A monograph describing overseas developments in the teaching of IT to similar target groups of students and their relevance to PEP in Victorian TAFE was also proposed. This monograph would pay particular attention to the British ITeCs.

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Materials catalogue

In producing a materials catalogue it was hoped to present a description of IT curriculum materials currently being used in PEP. This would include an appraisal of their usefulness. In addition, suggestions as to what materials could usefully be developed would be included.

Workshop

It was proposed that a workshop sponsored by the YPB be held early in 1986 to give PEP program staff the opportunity to review and have input into the implementation of the project outcomes.

By producing these outcomes the original terms of reference (as supplied by YPB) could be met, and the results would be in the form of useful documents for PEP program staff.

The Table 3.1 describes the final project outcomes in relation to the agreed terms of reference.

TABLE 3.1

Relationship between the final project outcomes and the terms of reference

	Project outcomes		
Terms of reference	**Annotated resources**	**Monograph**	**Project report**
a	x	x	-
b	-	-	x
c	-	-	x
d	x	-	x
e	-	x	-
f	-	-	x
g	x	x	x

Note: x = relation between project outcome and terms of reference.

The curriculum materials catalogue and the workshop for PEP teachers are project outcomes that have not been realised to date due to a dearth of curriculum materials being available and a lack of funding for the workshop. Nevertheless, suggestions for materials development are contained in this report and we would strongly urge that a workshop be held as soon as possible. The lack of curriculum materials in the colleges indicates that teachers do need immediate help.

Recommendation 1

A workshop for PEP teachers should be convened to facilitate the implementation of IT content in PEPs.

Recommendation 2

One agenda item for the workshop should be to design a mechanism whereby the form supplied in Appendix B can be used or adapted to develop a curriculum materials catalogue in the future.

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CHAPTER FOUR: RESEARCH DESIGN

4.1 INTRODUCTION

Because of the nature of the project, the TAFE National Centre for Research and Development adopted a team approach, rather than employing one person only, to undertake the study. The team consisted of four people, all of whom worked part time on the project:

- Executive Director (TAFE National Centre for Research and Development)
- Research and Development Officer (TAFE National Centre for Research and Development) - an expert in curriculum
- Research and Development Officer (TAFE National Centre for Research and Development) - an expert in Information Technology
- Special Projects Co-ordinator (RMIT) seconded from Victorian TAFE.

The research techniques used by the project team were:

- literature review
- college questionnaire, visits and interviews
- industry questionnaire, visits and interviews
- observation of information technology centres in the United Kingdom.

These techniques are further described in this chapter.

An Advisory Committee was established and met twice during the course of the project to discuss and review the progress of the project team.

The Committee membership was comprised of:

- an industry representative (chairperson)
- a representative of the Victorian TAFE Board (an expert in information technology)
- a representative of the Youth Programs Branch
- three of the four research officers (see Appendix A).

The committee agreed on two roles.

- To advise on project activities
- To read and comment on draft documents resulting from the project.

4.2 LITERATURE REVIEW

The literature review included computer searches, perusal of the researchers' personal libraries and the library of the TAFE National Centre, an examination of recent magazine and newspaper articles (e.g. computer supplements in The Australian) and an analysis of government reports. Of special use was material provided by the Victorian TAFE Board, in particular the YPB. Also of great value was the material provided by the PEP staff themselves.

The emphasis of the literature review was on locating resources and reference materials which could be recommended for use by PEP teachers both for personal knowledge and as teaching/learning materials. The results of this are presented in a separate document entitled Annotated Information Technology Resources for PEP Teachers (Sandery and Hall, 1986).

4.3 COLLEGE QUESTIONNAIRE, VISITS AND INTERVIEWS

In order to obtain both specific factual data about and a broad contextual knowledge of TAFE PEPs as they operate in Victoria, all eighty-eight programs were contacted by sending a questionnaire (see Appendix B) to all Colleges running PEPs. In addition, a selected group of programs were visited. From this a representative picture could be drawn of the operation of PEPs with particular attention being paid to the way in which they incorporated IT in their courses.

While the emphasis of the questionnaire was to obtain information relating to each program and the degree of provision of IT content in the curriculum, it was considered important that some perceptual and general data as well as specific data relating to the coverage of IT in the program be sampled in order to identify the nature of each program. Some understanding of the educational philosophy and context of the programs was considered an essential aspect of the data collection.

A draft questionnaire was prepared, evaluated, rewritten and then administered in its final form to all twenty-nine TAFE Colleges with PEPs. Every attempt was made to address the questionnaire personally to the person at each college responsible for the overall co-ordination of PEP. Generally that person was informed through a telephone call that the questionnaire would be forthcoming. The co-ordinator was advised that a project officer would be available to assist in the completion of the questionnaire if requested.

When the due date for the receipt of completed questionnaires by the project team had passed, co-ordinators who had not sent in a completed questionnaire were contacted and asked to comply. Regular contact was then maintained until either a completed questionnaire was received by the project team, the co-ordinator indicated that they would not be returning the questionnaire, or the 1985 academic year had ended, making it obvious that a questionnaire would not be forthcoming (in some instances program organisers already knew that they would not be funded for 1986).

The project team had been advised that the PEPs had been subject to close scrutiny with organisers frequently being asked to respond to inquiries. As a result PEP co-ordinators and staff have become very selective in what they will respond to by way of questionnaires or other requests for information. In an effort to obtain the maximum number of responses:

- the questionnaire was kept as brief as possible by excluding information obtainable from other accessible sources, such as survey data already held by the YPB;
- close and continuous liaison on behalf of the project team with addressees of the questionnaire was maintained.

Despite these attempts, only ten of the twenty-nine questionnaires were returned. As several of the larger colleges run more than one PEP during the course of an academic year, respondents were able to supply information on more than one program. In all, data were gathered on twenty-two distinct programs run by the ten colleges responded. This is a response rate of 34% of colleges contacted and represents 25% of the eighty-eight PEPs. Table 4.1 sets this out in detail.

In addition, further data were obtained through visits to three colleges that had not responded. An additional six PEPs then, beyond the twenty-two previously mentioned, were visited.

TABLE 4.1

List of colleges and number of programs about which data were collected by questionnaire

Colleges of TAFE from which a completed questionnaire was received	**Number of separate programs referred to in questionnaire by respondent**
Colleges of TAFE:	
Box Hill	1 (at 3 venues)
Collingwood	2
Frankston	1
Flagstaff	1
Holmesglen	5
Newport	4
Shepparton	1
Sunraysia	2
Wangaratta	3
Yallourn	2
Total	22

The questionnaire sought to obtain information from programs which would provide:

a) a delineation of the particular sub-section of the PEP target group that each program sought to cater for;

b) a quantification of the 'access' of programs to new technology hardware;

c) an indication of the IT curricula preferences of individual programs;

d) a description and critique of IT curriculum materials that individual programs have used or were currently using.

The information obtained from the questionnaire and the more general program data (obtained from the YPB of the TAFE Board) provided a data base upon which to draw system-wide perspectives. These data were supplemented by information of a more detailed nature obtained through a series of visits.

Of the eighty-eight programs operating in Victoria during 1985, ten were observed by the project team. This was an important aspect of the data-gathering process. The bulk of the program visits were undertaken by two members of the project team in the last week of November. The programs that were visited by members of the project team during the project are listed in Table 4.2

The timing of the visits in November meant that nearly all projects were being wound up for the year (some permanently!) and being prepared for the next year's intake. Many programs were therefore unable to be observed by members of the project team.

In selecting programs to visit, the following criteria were applied:

- projects that focus on the Hospitality/Tourism, Retail or Business/Finance area of potential employment or further study for their participants;
- programs attached to large colleges with a great deal of interaction between their activities and mainstream activities;
- different programs within the one College;
- country programs;
- programs that cater for the PEP target group at large;
- programs that placed emphasis on the use of computers or IT.

TABLE 4.2

Programs visited by project team members

College of TAFE	Program
Box Hill*	Ellingworth Parade Queen Street
Footscray	B.E.A.T. Trade Program for Young Women Bridging Access Food Services
Holmesglen*	Food Services
Collingwood*	Work and Education Refugee Program
Dandenong	Retail/Clerical
Frankston	The Way in Centre Rosebud

* Colleges which also responded to the questionnaire.

One of the difficulties in developing an IT curriculum for PEP in TAFE as a whole in Victoria is the diverse and individual nature of each program. Some programs are almost self contained units with little interaction with the host college. They may have little in the way of their own equipment or access to college-owned equipment particularly if the program is located away from the college. Other programs may be very much enmeshed with the host college and its activities, having ready access to equipment, facilities and mainstream staff. Programs located within the one host college can exhibit large differences in style of operation, mainstream liaison and access to facilities. Some programs have a distinct industry-specific vocational thrust while others seek to offer a broadly based educational experience. A full appreciation of the diversity that can be found within PEPs was thus sampled through the program visits.

Interviews and discussions were held with a wide range of people involved with PEP, whenever possible. The project team took the opportunity to speak with PEP staff attending an evaluation workshop at Marysville and staff of the YPB of the TAFE Board. When requested, assistance was provided with completing the questionnaire. Discussions were also held with teaching and administrative staff who, although not necessarily directly involved in PEP, had as part of their college function provided service to PEPs located in their college.

In all, the project team canvassed a wide variety of sources through its program of questionnaire survey, program visits and formal and informal interviews. A comprehensive overview of PEPs as they operate in Victorian TAFE and in particular, the emphasis they place on IT, was provided.

4.4 INDUSTRY QUESTIONNAIRE, VISITS AND INTERVIEWS

Any attempt to consider the IT curriculum requirements of PEPs cannot be undertaken without due consideration of the needs and aspirations of industry and commerce. After all, the reason for the existence of PEP in TAFE is because so many young people are unable to find employment. Indeed from the comments of PEP staff interviewed by members of the project team, it would seem that finding meaningful employment is the main priority of most PEP participants.

There is a large and rapidly increasing number of people in the Australian workforce who, as part of their job, are engaged in the operation of information technologies at the sub-professional level. It therefore makes sense to consider an IT curriculum in PEP as a path to possible employment. This is especially so when one considers that many of the operators of such technology are comparatively unskilled. That is, they are engaged in the operation of a single information system which requires a comparatively low level of knowledge to operate (Broadhead & Davis 1985).

A questionnaire (see Appendix C) was developed to obtain a measure of the current and anticipated use of IT in selected industries and commerce areas. This was done by adapting a survey instrument that had been used by the TAFE National Centre in a parallel study.

The questionnaire sought to obtain information from nominated industries which would provide:

a) an indication of the present extent of use and likely future use of IT;

b) possible base level job titles and duties;

c) specific IT applications and the selected knowledge and skill requirements;

d) the extent of provision of on-the-job training in IT.

Firms classified as being in the Hospitality/Tourism, Retail or Business/Finance areas of business and commerce (as specified by the terms of reference) were contacted by telephone and asked to participate in the survey. It was suggested that one of their staff (preferably from the personnel or training sections of the firm) be interviewed or requested to complete the questionnaire.

Of the twenty-eight firms contacted three declined to participate at this stage. Twenty-five agreed to receive the questionnaire and then decide. Sixteen of these firms returned a completed questionnaire. Interviews were conducted during October and November with eighteen people representing six firms or organisations from each of the three categories of Hospitality/Tourism, Retail and Business/Finance.

The interviews were held at the convenience of the person who was to complete the questionnaire. This was generally two to three weeks after the questionnaire had been mailed and always at the respondent's place of employment. On four occasions the interview was cancelled without notice due to more urgent priorities on the part of the would-be respondent. In one instance a new interview time was arranged, in another the questionnaire was completed and returned without an interview. In the other two instances, no further contact with the individual could be made. Table 4.3 lists the firms and organisations that were ultimately surveyed and interviewed.

In all instances the interviews were conducted in a receptive and helpful atmosphere. No doubts were raised on the part of respondents concerning their ability to obtain the information sought. If the individuals concerned had entertained any doubts about being able to supply the answers, they had either consulted with others prior to or after the interview, or forwarded on the questionnaire.

The basis of selection of the firms or organisations taking part in the project was the fact that they were major employers of personnel in the three industrial categories chosen. However, following the series of program visits already referred to (particularly the Holmesglen Food Services Program), it was felt that hospitals also should be represented in the industrial survey since they are a major source of employment for young people in the food trades area. It also became apparent from speaking to PEP staff that most PEP participants sought local employment. It was therefore decided to include some small businesses in the survey. One hospital and two small businesses (one retail, one business/finance) were approached and asked to take part in the survey. These interviews were held in late January using the same procedures. Table 4.4 lists those firms or organisations interviewed.

TABLE 4.3

List of major firms or organisations responding to the industry questionnaire and visit

Name of organisation	Classification*
Ansett Pioneer	H/T
Budget Rent-A-Car	H/T
Denny's	H/T
Jetset	H/T
Victorian Tourist Commission	H/T
O'Briens Catering	H/T
Billy Guyatt	Retail
Just Jeans	Retail
Safeway	Retail
Sportsgirl	Retail
B.H.P.	Bus/Fin
Elder's Finance	Bus/Fin
Federation Insurance	Bus/Fin
Ford (questionnaire only)	Bus/Fin
Shell	Bus/Fin
Statewide Building Society	Bus/Fin

* H/T = Hospitality/Tourism
Bus/Fin = Business/Finance

TABLE 4.4

Supplementary list of firms/organisations responding to industry questionnaire and visit

Name	Classification
Alfred Hospital	H/T
D & M Apparel	Retail
J. R. - Accountant	Bus/Fin

4.5 OBSERVATION OF ITeCs IN THE UNITED KINGDOM

One member of the research team spent three weeks in the United Kingdom visiting six ITeCs and various other bodies with responsibility for IT training.

At each ITeC, a structured interview was held with the manager and other staff. Trainee classes in progress were observed, and some learning materials were collected. The equipment in the workshops and laboratories was noted in each case. General information, such as syllabus documents and budgets, was also collected.

Chapter 6 of this document describes these overseas initiatives and some implications for PEP in Victoria. An extensive description of ITeCs in the United Kingdom is presented in a separate document entitled Information Technology Centres--An overseas initiative applicable in Australia (Hayton, 1986).

CHAPTER FIVE: INFORMATION TECHNOLOGY AND PARTICIPATION AND EQUITY PROGRAMS

5.1 OVERVIEW OF WHAT IS BEING DONE

During 1985 there were 88 PEPs that were run under the auspices of Victorian TAFE. The majority of programs commenced operations in February-March of that year and ran for some 30 to 40 weeks. The usual number of weekly contact hours was close to 30, with about half of the programs having approximately 15 to 20 initial enrolments. Tables 5.1, 5.2 and 5.3 present data provided by the YPB of the TAFE Board on 77 of the 88 programs.

TABLE 5.1

Month of commencement of programs

Month	**No. of programs commencing**
January	1
February	31
March	28
April	8
May	2
June	4
July	2
August	1
Total	77

TABLE 5.2

Number of contact weeks for programs

No. of contact weeks	**No. of programs with stated no. of contact weeks**
8 - 12	3
13 - 17	5
18 - 22	14
23 - 27	4
28 - 32	8
33 - 37	26
38 - 42	12
43 - 47	2
48 - 52	1
Nil response	2
Total	77

TABLE 5.3

Cross tabulation of initial full-time enrolment numbers by gender

No. of participants	**No. of programs with given no. of f/t male participants**	**No. of programs with given no. of f/t female participants**
0 - 6	21	15
7 - 13	28	34
14 - 20	12	13
20+	7	9
Nil response	9	6
Totals	77	77

Furthermore, of the seventy-seven programs referred to in the above Tables, fifty-seven of them indicated that they offered some form of IT or computer studies with thirty-six of the fifty-seven offering some studies in word processing. In general, the type of studies offered in the area of computing/word processing and the amount of time devoted to these studies varied considerably. It varied in the extreme from one program estimating that it devoted three minutes per week (averaged over its total period of operation) to offering a basic course in computer literacy and programming, to another spending an average of 18 hours per week on word processing. In general however, two to four hours per week appeared to be a common period of time devoted to computer/word processing studies by those programs that offered this option.

To illustrate the diversity of IT topics offered and the amount of time spent on IT, thirteen PEPs were selected from the fifty-seven that offered IT studies. These are listed in Table 5.4. It can be seen from this that there was a wide range of IT studies offered by the PEPs, and a big variation in the time spent on IT study. For those programs that offered IT or computer studies, the largest time spent was 20 hours per week, and the smallest time spent was three minutes per week (averaged over the entire program).

TABLE 5.4

Sample selection of computer studies offered by PEP programs

Topics in IT offered by various programs	Average no. of hours per week
word processing to a commercial standard	2
computer operating	4
computer studies mainstream	2
basic awareness of computers	1
basic programming	as required
introduction to basic programming	3 minutes
online Plato	4
word processing	3
keyboard skills	1
Lotus 1-2-3	various
basic computer skills & word bee word processing	2
social and theoretical aspects	2
operating systems, computer applications	20

Of the programs that offer some form of computer/word processing studies, less than half used equipment 'owned' by the program, the majority using equipment owned by their host college or some other educational institution. Interestingly however, the majority of programs used their own or sessional staff to provide the tuition. Of the programs offering some form of computer studies, only 25 of the 57 indicated that they used mainstream staff to provide tuition for their computer studies.

Turning to the colleges that responded to the project team's questionnaire it is noticeable that of the 22 programs represented, only eight of them were not targeted to specific student groups within the PEP catchment group or to a specific area of post-PEP employment. Table 5.5 indicates that range of specific student groups and the range of vocational orientations in the sample of 22 PEPs.

TABLE 5.5

Summary of specific student intakes and vocational orientation of programs surveyed

Student group	No. of programs	vocational orientation	No. of programs
aboriginals	2	health & beauty	1
young migrant women	1	commerce	2
physically/mentally disabled	2	trades	2
refugee youth	1	hospitality	4
migrants	1	radio/theatre	3
young women	1	building	1
Not specific	14	Not specific	9
Total	22	**Total**	22

Given the fairly specific nature of the programs surveyed, it was therefore somewhat surprising to see that when asked to indicate what had been the main factors in determining the IT content of their programs, six out of the ten respondents ranked student demand as most important. The staffing of the program was ranked overall as the least critical factor in determining the IT content of the programs. The results obtained are presented in Table 5.6.

TABLE 5.6

Ranking of factors that had been crucial to the determination of the IT content of a program

Factor / College	facilities	staff	equipment	student demand
College 1	N/R	N/R	N/R	N/R
College 2	1	1	1	1
College 3	N/R	N/R	N/R	N/R
College 4	N/R	N/R	N/R	N/R
College 5*	2	1	3	4
College 6	-	2	-	1
College 7	3	4	2	1
College 8	3	4	2	1
College 9	3	5	1	1
College 10	3	2	3	1

1 = most critical .... 6 = least important

N/R = nil response

*occupational analysis was ranked fifth by College 5

A similar response was also obtained when respondents were asked to rank what they considered should be the main factors in determining the IT content of their programs. Table 5.7 presents the results obtained for the anticipated crucial factors.

TABLE 5.7

Ranking of factors that should be crucial to the determination of the IT content of a program

Factor College	facilities	staff	equipment	student demand
College 1	3	1	2	-
College 2	1	1	1	1
College 3	3	1	2	4
College 4	N/R	N/R	N/R	N/R
College 5*	4	5	3	2
College 6	-	2	-	1
College 7	N/R	N/R	N/R	N/R
College 8	3	4	2	1
College 9	4	3	2	1
College 10	3	2	3	1

1 = most critical .... 6 = least important

N/R = nil response

*occupational analysis was ranked first by College 5

When asked to provide an indication of the type of IT equipment that was available to their programs only two respondents indicated that they had no access to any IT equipment. The rest all indicated that they had access to some equipment. There was, not unexpectedly, some variation in the amount of time that this equipment was available to the programs, although the type of equipment available seemed consistent across the programs with the exception of one. A summary of the type of college-owned equipment programs have access to, and an indication of the time it is available to them is presented in Table 5.8.

TABLE 5.8

Survey of information technology equipment available to programs

Item of equipment	No. of Colleges where stated item of equipment is available to PEP	No. of hours/week accessed by PEP program			
		0	1-10	11-20	20+
Mainframe	4	1	3		
Microcomputer(s)	5	2	3		
Minicomputer(s)	3	1	1		1
Computer networks	1		1		
Information bulletins	1	1			
Telex	1				1
Electronic mail	1	1			
Word processors (dedicated)	2	1	1		
Access to Plato	1		1		
Access to data bases (e.g. ERIC, Viatel, etc.)	1	1			

Note:

One respondent indicated no access to college equipment but did not specify equipment.

One nil response.

The results of the survey would suggest that not only the programs have access to only a narrow range of IT equipment, but also the colleges in which they are based. This may be one of the reasons why there is a very 'limited' (in terms of variety) IT offering by programs. Of the twenty-two programs represented, only seven indicated that they offered a separate IT course in their program. All seven of these offered:

- keyboarding;
- exposure to computer packages (generally word processing);
- exposure to programming.

Of the seven programs that did offer such studies in IT, only four included the study of the social implications of the new technologies. Yet each of these programs indicated that they did offer some form of personal development or life-skills component in their overall program. One program that did not offer studies in IT did include a study of the social aspects of the IT as they affected the lives of the participants. All the programs surveyed indicated that they offered some form of literacy, numeracy and life (social) skills as part of their educational program.

5.2 ISSUES AND CONCERNS

Of the 88 PEPs in operation in 1985, it can be said that no two were the same. Each program operated within unique circumstances and was tailored accordingly.

We see for example, variation in:

- program target group
- length of program
- primary focus of program
- program facilities
- equipment available to program
- qualifications and interests of program staff
- college-program relations.

Such variation naturally leads to differences in the way programmers approach the educational and sociological content of their program. These differences can assume quite marked proportions, although all programs appear to include some form of literacy, numeracy and personal development (life skills) content.

While all programs have discrete aims, the Office of the TAFE Board has a set of aims within which all PEPs in Victoria must operate. It is therefore possible to consider the formulation of a common IT curriculum framework that could be applicable to all programs in a manner that does not seek to make all programs conform, but rather is adaptable to their style and format of operation.

In this formulation of an IT curriculum for PEPs it is important to avoid the extremes between programs that are rigid, tightly prescriptive on the one hand and programs that are so general and flexible that they are difficult to apply. To achieve a balance, the following issues need to be considered.

a) While it can be argued that one of the strengths of PEPs in Victoria is their ability to cater for the immediate needs of small groups of unemployed, it is also a potential weakness. Long term needs are also important. However, long term needs are not as readily articulated as short term needs and may be neglected for this reason.

In TAFE Vocational Programs classes are very structured and tightly prescribed with precise long term goals. One must take particular care to ensure that longer term goals are also catered for by the programs if, as stated in the TAFE Board submission to TAFE Council - Participation and Equity Program 1966 (p. 1): 'The main aim of the Participation and Equity Program in TAFE Victoria has been in accordance with the Commonwealth's guidelines, to provide courses which will enhance employment prospects of long term unemployed young people'.

The Victorian TAFE PEP Census 1985 (p. 16) shows that 'educational objectives (34%) followed by employment objectives (28.8%) are given as the two most important reasons for joining the program'.

PEP staff need to ensure that their program is meeting these aspirations of participants and that the IT content is also influenced by these objectives. The sentiments expressed in the following extract of a recent OECD report highlights an issue of concern.

> From the point of view of social policy, the current arrangements are not equitable because those young persons with least education and least preparation are thrust into the most unstructured situation requiring the broadest range of decisions. Since the most important determinant of education achievement is socio-economic background, this set of arrangements reinforces patterns of inequality by channelling early school leavers into a unstructured set of opportunities having a high probability of failure. (Lechte, 1985).

b) Participation and equity needs to be viewed in its broadest context when considering a system-wide initiative. There were, after all, some 96% of unemployed youth that did not take part in PEP programs in 1985 (Hyde, 1985). It is dangerous to base all decisions about a program on a proportion of only 4% of the total number entitled to participate.

c) There is every indication that IT skills (refer Section 7) will be just as necessary to be acquired (to be taught) as basic literacy, numeracy and life (social) skills in both mainstream education and in employment. Indeed the Kirby Report (p. 115) states: 'The skills required to manipulate and use information technology will be important for personal development and future employment'. Any attempt to develop an IT curriculum should reflect this fact, as should the programs. Viewed in this context, therefore, programs may have to offer IT skills in addition to the usual literacy, numeracy and life skills.

d) At this stage of IT use by Australian industry and commerce there is no discrete 'information industry' with professional membership (Broadhead and Davis, 1985). There are therefore, no caveats in terms of putting IT skills to use in employment. This means that basic training in the area of IT is a worthwhile option as compared with, for example, accounting where there exists a whole host of 'qualified' people also competing on the job market.

e) While the Federal Government is implementing a 'computers in schools program', currently unemployed youth aged 15 and over, will not obtain training in this area, unless this is redressed through programs such as PEP, they may be disadvantaged even further.

If, as appears to be the case, in-house staff are used for the majority of programs to provide training in the area of computing and word processing (refer Section 5.1), this may also be the case in the presentation of an IT curriculum. Should this be so, they will need to feel comfortable with the broad aspects of IT such as computer networks, electronic mail, viatel, facsimile transfer, social implications, etc. and not just those related to personal computers. Any IT content will need to include such aspects if it is to be seen as a viable option for obtaining work (refer Chapter 7). The issues of staffing and the teaching of IT is further discussed in Chapter 11 of this report.

The majority of PEP participants enter the scheme in an effort to obtain training and hence a job (an experience substantiated by the Victorian TAFE PEP Census 1986). Any IT curriculum should, therefore, provide PEP participants with the skills and knowledge that would be immediately applicable in the work place. It must also provide for the acquisition of knowledge and skills that are more applicable in the long term. That is, it must be useful for those who wish to study further and undertake some form of vocational training in order to seek the job of their choice, as well as being relevant for those who don't intend to do either. It must therefore also be relevant for personal development. These issues relating to the presentation of an IT curriculum in PEP are discussed in Chapter 8 of this report.

CHAPTER SIX: SOME OVERSEAS INITIATIVES

6.1 INTRODUCTION

One of the objectives of the present study was to determine the merits and drawbacks of overseas initiatives, such as the Information Technology Centres (ITeCs) in the United Kingdom (U.K.) targeted at disadvantaged groups and designed to assist such groups overcome their disadvantage through the development of skills in the field of information technology.

A literature search revealed that very little useful information was available on such overseas initiatives. An ERIC search revealed no literature on post-school information technology training initiatives targeted at disadvantaged groups in the United States. Further searching revealed some articles on information technology centres (ITeCs) in the U.K.

The ITeC program in the U.K. has generated much interest in Australia and other countries and is of particular interest in this study because it is aimed at disadvantaged youth. Because of this thrust, and the lack of comprehensive information available in Australia on ITeCs and similar initiatives, a member of the project team visited the U.K. in June and July 1985 to study ITeCs and other initiatives in the U.K.

Much of the information collected during this visit to the U.K. is reported in an outcome of this project, a monograph entitled Information Technology Centres - An Overseas Initiative Applicable in Australia by Geoff Hayton. The monograph includes details of information technology curricula for three U.K. programs:

- traineeships at the ITeCs in the U.K;
- other traineeships within the U.K.'s Youth Training Scheme;
- the U.K.'s Certificate of Pre-Vocational Education.

The following sections of this chapter, other than the last section, cover information which is taken up in more detail in the monograph.

6.2 OVERVIEW OF INITIATIVES IN THE UNITED KINGDOM

In the United Kingdom the main post-school initiative in information technology training targeted at disadvantaged groups is the Youth Training Scheme (YTS).

The YTS programs are mainly controlled and funded by the Manpower Services Commission (MSC). The MSC provides trainee allowances to the trainees and partial funding to the employer, training centre or educational institution, as appropriate. Various other bodies contribute to the capital or recurrent expenses of the training centres involved. These bodies include the Department of Trade and Industry (DTI), commercial organisations, the local education authorities and the Department of Education and Science.

The providers of on-the-job and off-the-job training for the YTS programs are employers, Further Education Colleges and various other training centres including Information Technology Centres (ITeCs). A variety of arrangements for on-the-job and off-the-job training are used. Two common arrangements are:

- the employer provides on-the-job training and the Further Education College provides off-the-job training;
- the training centre (such as the ITeC) provides all on-the-job and off-the-job training.

Trainees who successfully complete their one year YTS program obtain a certificate of attainment from the MSC. However, there is a trend towards national accreditation of part or all of the YTS programs through the traditional accrediting bodies outside the MSC. The main reasons for this trend are greater employer acceptance and easier access to and credit towards courses outside the YTS.

A number of organisations in the U.K. have a national responsibility for accreditation of education and training below degree level. The Business and Technician Education Council (BTEC) accredits the national certificate and national diploma courses. The City and Guilds of London Institute (CGLI) accredits industry and technology based craft or trade courses. The Royal Society of Arts (RSA) accredits arts and secretarial courses at craft level. The Joint Board for Pre-Vocational Education (administered by the BTEC and CGLI) accredits certificates of pre-vocational education.

All YTS programs are currently of one year's duration, but the United Kingdom Government has announced its intention to increase this to two years from mid-1986.

The stated purpose of the YTS is to provide a year of foundation training to help 16-and 17-year-old school leavers in the transition to adult and working life. The aims of the scheme are to help these young people:

- to achieve initial competence in an occupation;
- to be able to transfer knowledge and skills acquired in one occupation to other, possibly quite different, occupations;
- to acquire knowledge and skills which they need to progress to further education and training in the same or different occupations;
- to cope with the world outside employment.

(MSC, 1985, p. 1)

Some see the overall purpose of the YTS as a response to the 'failure' of the educational system in Britain. Jim Smith from the MSC states 'Kids are so ill-equipped when leaving school that they need a year of broad training to match their skills with industry' (cited in Chown, 1985, p. 25). At the same time, the YTS is seen as a plan for the unemployed. Most of the 16-and 17-year-olds in the YTS would have been unemployed for much or all of the year in which they undertook their training. It is estimated that without YTS the unemployment rate among 16-and 17-year-olds would be 56% (Chown, 1985, p. 25).

In 1984, there were about 380,000 trainees in the YTS in the United Kingdom. These trainees were distributed among three modes of training as follows:

Mode A	employer based: 280,000 trainees;
Mode B1	training workshops, ITeCs, or community projects: 70,000 trainees (about 5,000 trainees in ITeCs);
Mode B2	various other arrangements: 30,000 trainees.

With the increase to two-year programs the number of trainees within the YTS at any one time is expected to be about 600,000.

Clearly the YTS involves a major financial commitment from the United Kingdom Government. The cost in the 1985/86 financial year, before the introduction of two-year programs, was about £850 million.

All one-year YTS programs include training in what is called 'core skills'. The core skill areas are:

- number
- communication
- problem solving
- practical
- computer and information technology.

The inclusion of computer and information technology as a core skill area is justified on the grounds that there is every indication that computer-based activities will be present in all jobs in the future (MSC, 1985, p. 1). In addition, information technology and its implications will be increasingly felt not only throughout industry and commerce, but also in people's daily lives.

The aims of the Computer and Information Technology core are:

- to provide young people with practical experience in using computers as working tools to carry out useful activities;

- to promote understanding of the applications of computers and information technology in the work place and in the world outside employment.

The Computer and Information Technology core skills are listed in a separate monograph (Hayton, 1986, p. 27). The amount of time specified for the teaching of this core in the YTS is two weeks' full time. All those with experience in this program who were interviewed commented that two weeks were insufficient to achieve adequately the stated objectives of the core.

Teaching of the Computer and Information Technology core is usually undertaken by the Further Education College which is providing the other parts of the off-the-job program, or by a nearby Information Technology Centre.

A small proportion of the 380,000 trainees undertake one year traineeships in Information Technology under the YTS umbrella. A few of the Information Technology trainees undertake employer based programs (i.e. mode A), but most (about 5,000) undertake a training centre program (mode B1) at one of the 175 ITeCs in the U.K. While the main purpose of the ITeCs is to provide the one-year training program under the YTS, they undertake a number of other activities which also have an impact on disadvantaged groups of young people.

The ITeCs in the U.K. are of great interest in this study because they provide a model of information technology training for groups of disadvantaged young people which is innovative, unique and successful. This success has resulted in a number of other countries closely studying the United Kingdom ITeC model and considering its implementation. France, Ireland, Denmark and Canada have adopted the ITeC model and various moves are being made in Australia to set-up ITeCs based on the U.K. ITeC model. Thus, the following section examines the ITeCs in the U.K.

Before moving on to examine the ITeCs in some detail, it is worth noting one important initiative outside the YTS which involves post-school information technology training for disadvantaged groups of young people. This is the Certificate of Pre-Vocational Education, a one year full-time course for those 16 years or older. It is accredited by the Joint Board for Pre-Vocational Education.

The aims of the Certificate of Pre-Vocational Education are:

- to assist the transition from school to adulthood by further equipping young people with the basic skills, experiences, attitudes, knowledge and personal and social competencies required for success in adult life including work;
- to provide individually relevant educational experience which encourages learning and achievement;
- to provide young people with recognition of their attainments through a qualification which embodies national standards;
- to provide opportunities for progression to continuing education, training and/or work.

In 1985 ten certificate programs had been developed for the following 'clusters':

- Control of Organisations
- Services to Business
- Information Technology and Micro-electronic systems
- Service Engineering
- Manufacture
- Craft-based activities
- Retail and Wholesale
- Health and Community Care
- Recreation Services
- Hospitality (including Food and Accommodation).

Within all of these programs, core competencies are specified in each of the following ten areas:

- Personal and Career Development
- Industrial, Social and Environment Studies
- Communication
- Social Skills
- Numeracy
- Science and Technology
- Information Technology
- Creative Development
- Practical Skills
- Problem Solving.

The information technology core competencies consist of a mixture of broad-based and practical skills and knowledge and are listed in a separate monograph (Hayton, 1986, p. 31). The amount of time required for the learning of these skills is not specified.

The main providers of Certificate of Pre-Vocational Education programs are colleges of further education and secondary schools.

6.3 INFORMATION TECHNOLOGY CENTRES

The ITeC program in the U.K. grew out of the Notting Dale ITeC established by Chris Webb in 1979. At the time, Chris Webb was Co-ordinator of Notting Dale Urban Studies Centre. He developed the ITeC as a means of addressing the job-skill mismatch in the local area. He saw this mismatch as a

> gap between the information technology training needs of firms in the area and local kids who saw themselves locked out of junior jobs in their own area because of both the recession and micro technology penetrating the local economy. (cited in Gow, 1984, p. 25).

The U.K. Government was impressed by what was achieved at Notting Dale and decided to expand it into a national program, enlisting the help of Chris Webb. The first ITeC allocation of funds for 20 centres was announced by the British Prime Minister in July 1982. The initial centres were sited in the inner city areas of Glasgow, London, Liverpool, Bristol and Newcastle. In the subsequent expansion to 100 ITeCs, the new ITeCs were sited in areas of high youth unemployment, mainly urban. Increasing demand has expanded the number to 175. Other recent developments have included proposals to establish cluster based centres to serve rural and less densely populated areas (e.g. North Wales, Lincolnshire and Devon).

The central training activities of the ITeCs were brought under the umbrella of the Government's Youth Training Scheme (YTS). The YTS aims to provide unemployed young people, aged under 18, with training and work experience over a 12-month period. It is somewhat similar to the new Australian Traineeship System (ATS). Each ITeC offers between 30 and 70 trainee places--about 6,000 in total.

All YTS programs are currently of one year's duration, but the United Kingdom Government has recently announced its intention to increase this to two years.

While the main function of each ITeC is currently to provide the one-year training in information technology (IT) for 16-and 17-year-old school leavers under the Youth Training Scheme, each ITeC provides a variety of other services as well. These services include:

- trading (for profit) in IT equipment and services;
- offering (for profit) short training courses in IT;
- offering training in the core skills of IT for other traineeships under YTS (10 days' full time or equivalent);
- offering training in IT for various groups (e.g. school students, teachers, and further education lecturers), under various government-funded schemes;
- offering various community and IT services (e.g. youth club, access to Communitel viewdata, computer bureaus, computer aided drafting services and graphics services).

Selection of trainees

Trainees are usually selected after a personal interview with one or more members of the ITeC staff. Selection policy varies to some degree among the ITeCs. The two main characteristics required for selection are 'educational disadvantage' and high motivation to work in information technology.

The educational disadvantage criterion is loosely defined. Most young people applying to enter the ITeCs have records of low achievement at school. Those with records of moderate to high achievement are counselled to enter further education.

Funding

The ITeCs are funded mainly by the Manpower Services Commission but also receive funding from the Department of Trade and Industry and a sponsor - usually the local council's education authority or a private sponsor.

Most of the ITeCs also obtain funds from their trading activities.

The amount of funding varies for each ITeC. Only the Manpower Services Commission and Department of Trade and Industry contributions are fixed by a national formula.

It is clear from the level of funding that the ITeCs in the U.K. are very well resourced and enjoy a strong financial commitment from the British Government through the agency of the Manpower Services Commission.

Equipment

The ITeCs in the United Kingdom are well equipped. All of the ITeCs visited adopt the following principles in deciding upon equipment:

- that there should be sufficient numbers of computers and typewriters to allow one trainee per unit of equipment;
- that preference should be given to 'business' rather than 'educational' computers;
- that there should be a variety of computers and typewriters rather than one standard model.

Curricula and accreditation

The curriculum of each ITeC, to a large extent, is developed locally by the staff of the ITeC, who are guided by what they perceive to be the local employment opportunities in information technology. In addition, core skills of literacy and numeracy have been laid down by the Manpower Services Commission.

Thus although the curriculum of each ITeC varies considerably, a general pattern exists. The ITeCs usually offer each of three types of training in:

- computing and software
- electronics and hardware
- the electronic office.

All trainees undertake training in all three of these areas during an initial period. They then specialise in one of these three areas, and undertake a related job placement (monitored by the ITeC staff) for a period of one or two months.

A part of the one-year program involves education in broad aspects of information technology and life and social skills (including job search and interview techniques). Some ITeCs undertook this at the local further education college. At Derby ITeC for example, one day per week was spent at the nearby Derby Further Education College.

Although the ITeCs have locally developed curricula, there is now a movement towards a nationally-accredited curriculum. In the United Kingdom, the vehicle of national accreditation appears to be the City and Guilds of London Institute's 'Information Technology 726 Scheme'. The 726 Scheme consist of a group of curriculum modules, each module covering a topic in information technology at one of the four levels of introductory, elementary, intermediate and advanced. Most ITeC managers interviewed stated an intention to adopt this scheme, or at least some of the modules from it. The 726 Scheme is still at a somewhat early stage of development.

The ITeCs see themselves as mainly providing 'on-the-job' training in aspects of information technology. Some of the ITeC managers interviewed claimed that the job relevance of their training was ensured by the trading activities of the ITeC. The trainees undertook 'real work rather than academic tasks'. Many of the staff interviewed mentioned that the hardware and software used by the trainees was the same as the equipment and material they would use when employed.

Staffing

The trainee:staff ratio of 5:1, allowed for funding purposes by the Manpower Services Commission, is the minimum staffing level of each ITeC. Local sponsorship at some ITeCs allows this staffing level to be exceeded.

It should be borne in mind that these figures include non-teaching staff, including the manager and the clerical assistant. Nevertheless, this level of staffing is generous compared with the average for TAFE in Australia. It allows for an adequate amount of supervision of trainees during practical classes.

Many of the ITeC managers pointed out the difficulty they had had in obtaining staff with a suitable balance of technical and teaching skills. Most managers had appointed staff with a strong technical background. Such staff were encouraged to develop their communication and teaching skills through various staff development activities, including formal courses.

Outcomes

The ITeCs see their main objective as the provision of information technology skills and other skills to enable trainees to obtain related employment. Given the current high rate of unemployment of young people, another objective stated is to impart broad-based and transferable skills to the trainees for possible future employment (particularly when the economy strengthens), and to encourage trainees to undertake further education. In the context of the ITeCs these transferable skills are not well defined. They include information technology skills, such as using spreadsheet software, which are practised for particular business applications but are claimed to be transferable to other business applications.

The ITeC staff interviewed also saw various positive social consequences in training unemployed young people for one year. Many of the trainees in the ITeCs would expect to be unemployed for much or all of the one-year period. One year at the ITeC, or any other structured activity, was seen as a better alternative than unemployment, even if employment or a place in further education was not an immediate outcome of the one-year program. It was conceded by many of those interviewed that this outcome could not be used as an argument to justify funding of the ITeCs. They saw the main justification of the ITeCs in the high rates of placement in employment or full-time further education.

The overall impact of the ITeCs has been to increase the participation of disadvantaged young people in post-school education and training. The IteCs have been successful in motivating young people, particularly those with a record of 'failure' at school, to learn new skills. The non-school atmosphere of the ITeCs is regarded as important in this. The target group of trainees generally have negative feelings about school and positive feelings about work. The ITeCs succeed in providing an environment closer to that of a factory or office than of a school. This is achieved through the physical layout of the ITeC and the real work tasks undertaken in the program.

With regard to their primary stated objective, which is the provision of information technology and other skills to enable trainees to obtain related employment, the ITeCs appear to be reasonably successful. About 60% of trainees obtain jobs soon after the one year program and a further 10 to 15% go on to full-time further education.

6.4 THE APPLICATION OF ITeCs IN AUSTRALIA

If ITeCs similar to the United Kingdom model are to be set up in Australia, two issues need to be resolved. Firstly, the goals of the ITeC program in Australia, and any variation with those of the ITeCs in the U.K., need to be considered. Secondly, the ITeC model that achieves the intended goals needs to be developed, perhaps based on the successful U.K. model but adapted to the Australian environment. It could be less than successful merely to transfer the U.K. ITeC approach to Australia.

Examination of the structures and outcomes of ITeCs in the U.K. in the previous chapter gives an overall picture of a complex training and business organisation with multiple outcomes. As well as complexity there is variety. Within the national guidelines imposed by the MSC and other bodies, the ITeCs vary considerably in the type of trainee they select, the training program offered and the scope of their trading activities. This variety was clearly seen even in the six ITeCs that were visited by the author. Thus, when referring to the U.K. ITeC model it needs to be understood that the reference is to a model in which only the general features are defined, allowing for variation in detail. It is argued in this paper that this general U.K. ITeC model should be applied in Australia because it is successful and would fulfil some information technology training needs here. However, the model needs to be adapted to suit the Australian context which differs from the U.K. in political structures, education and training systems and geography. It is further argued that in the process of such an adaptation, the essential ingredients of the U.K. ITeC model should be preserved to ensure that any ITeCs established in Australia will be as successful as those in the U.K.

The main goal of the U.K. ITeCs is to prepare 16-and 17-year-old school leavers and unemployed youths for information technology jobs in industry and commerce. In this they are largely successful but, as we have seen, a small proportion of graduates go on to further education or are unemployed. It is interesting to compare this goal with the general goal of Participation and Equity Programs (PEP) in TAFE, which is to increase the participation of disadvantaged groups in TAFE courses. It is difficult to say whether the ITeC has the effect of increasing or decreasing participation in education. Some of the ITeC trainees would have gone straight from school to work or unemployment if the ITeC program had not been available, whereas others would have gone straight into TAFE or perhaps advanced education courses. The ITeC program has the effect of increasing the participation of the former group and possibly reducing the participation, in terms of overall time in education or training, of the latter group. In the absence of any direct research on this issue, we believe that the overall impact of the ITeCs is to increase the participation of disadvantaged young people in post-school education and training as the number of young people in the latter group is thought to be very small compared with the number in the former group.

The age range of trainees at the ITeCs is regarded as an important issue. Chris Webb and others interviewed in the U.K. felt that the 'non-school atmosphere' of the ITeCs should be enhanced by broadening the access from 16-and 17-year-olds to 15-to 24-year-olds (cited in Gow, 1985, p. 30).

The most likely scheme to support these trainees in Australia is the Australian Traineeship System (ATS). A recent report in Australia recommended the development of two across-industry traineeships in information technology in the area of

- the electronic office;
- computing and software (Hall et al., 1985, p. 23).

If this recommendation is adopted, it would be appropriate for the proposed Australian ITeCs to offer at least some of these two types of traineeship.

Another goal of the U.K. ITeCs is to provide broad training in information technology that will increase the trainee's future job mobility and adaptation to change. This is the 'long-term jobs' objective and it conflicts, at least to some extent, with the objective of training for specific and immediate jobs (the 'short-term jobs' objective). As we have seen in the previous section, the ITeCs provide an interesting mixture of training for specific information technology jobs and broader training or education. This mixture varies considerably among the U.K. ITeCs. There are two ways in which the ITeCs broaden the information technology training. The first is to teach more general aspects of information technology, including its social implications. The second is to teach a broad range of transferable skills in the three areas of computing and software, electronics and hardware, and the electronic office. With the change to two-year programs in 1986 the Manpower Services Commission sees this mixture continuing, with the first year of the program mainly devoted to broad-based training and the second year mainly devoted to specific training.

The goal of broad training in information technology raises two issues of general interest to educators. The first is the perennial debate on specific vocational training versus general education or training. Specific vocational training prepares for placement in immediate jobs and increases the relevance of the training program. General vocational education is less likely to become obsolescent (as jobs change) and it enhances the future mobility of the trainee. However, the elements of a general vocational education have not been clearly defined (Grubb, 1984, p. 446).

The second issue is the direction of broadening. More traditional programs tend to broaden the training across various jobs and technologies within the one industry. The ITeC programs tend to broaden the training across various jobs and industries but within the one technology (i.e. information technology). Many of those interviewed in the U.K. felt there was a need for both types of broad training.

A further goal of the U.K. ITeC is to foster a close involvement with local businesses to ensure the relevance of the training, to encourage the efficient use of information technology by small business and to provide a further source of revenue for the ITeC. The scope of this involvement varies considerably among the ITeCs and so it should - each ITeC should adapt to the local business environment to achieve the most appropriate relationship. Activities include providing short courses in aspects of information technology, selling hardware and software and providing information technology services.

The U.K. experience is that this close involvement with business and industry helps to keep the ITeC up to date with 'state of the art' information technology. This is further encouraged by networks with education and research institutions.

Many ITeCs arranged their trading activities through a formally set up trading company. Although the trading activities of the company and the training activities of the ITeC are largely integrated, the accounting is kept separate. The company profits are used by the ITeC and, if the profits are sufficiently large, a proportion must be given to the MSC.

The trading activities of the ITeC provide the abovementioned benefits but they also carry a cost. The cost is the time taken by the ITeC staff in liaising with businesses, and conflicts in various ways with the training activities. All ITeC staff interviewed recognised that a conflict existed between the trading and training activities of the ITeC. A variety of methods were used to minimise this conflict including:

- having a single designated member of staff as 'enterprise officer' to seek business;

- limiting the accepted paid work to that which fitted in easily with the training program.

Another goal of the U.K. ITeC, in addition to that of training 16-and 17-year-olds, is the training of specific groups (particularly disadvantaged groups) in information technology for particular purposes. The specific groups include school children, women over 24 years old, ethnic groups and the disabled. The purposes include learning a particular programming language, word processing and using a particular software package. These activities are initiated at the local ITeC level and therefore vary among the ITeCs. They flow naturally from the links between the ITeC and the local community and the presence of the ITeC resources of staff and equipment.

To recapitulate, the four strategic goals of the U.K. ITeCs may be summarised as:

- to prepare 16-and 17-year-old disadvantaged young people for specific information technology jobs;

- to concurrently provide broad training in information technology;

- to foster a close involvement (including trading) with local businesses and the local community;

- to train specific groups in aspects of information technology.

These goals should be those of any ITeC program in Australia, except that the age range of young people entering the traineeship in information technology should be widened to include perhaps 15-to 24-year-olds. The U.K. age restriction to 16 and 17 year olds applies to all trainees in the Youth Traineeship Scheme and is a policy resulting from a promise by Mrs. Thatcher to give all school leavers the opportunity to enter either a job, full-time education or a traineeship. As mentioned above, ITeC staff in the U.K. supported the widening of the age range.

If ITeCs are to be established in Australia to achieve the abovementioned strategic goals, an Australian model needs to be developed. The U.K. ITeC model can be used as a basis, with variations designed to suit the Australian context. In developing an Australian ITeC model, the following aspects need to be considered:

- funding;
- location;
- types of program to be offered (particularly PEP programs);
- links with the local community, industry and educational institutions;
- administrative arrangements.

Most of these aspects in the U.K. context are discussed in Section 5.3. Some have also been discussed in the Australian context in a recent publication by the National Training Council entitled The possible implementation of an Information Technology Centre (ITeC) program in Australia, (Webb, 1985). The Webb Report addresses some of the key issues involved in the organisation of ITeCs in Australia but some issues have yet to be addressed. Despite this, some early moves are being made in Australia.

In September 1985 the Federal Minister for Employment and Industrial Relations, Mr. Ralph Willis, announced the establishment of three pilot ITeCs in Australia, based on the recommendations of the Webb Report. It is clear from his media statement that many important details are yet to be determined. The $400,000 allocated is far less than that allocated in the first year to any three new ITeCs in the U.K.

Recommendation 15 in the Webb Report calls for the establishment of an Australian version of the U.K. Information Technology Consultancy Unit to support the establishment of new ITeCs. This recommendation has not as yet been acted upon.

In addition to the Federal Government ITeC initiatives, a number of ITeCs have been, or are about to be, set up in Australia through State government, industry, or local community initiatives.

Some of the organisations involved include:

- Compuskill at Matraville, Sydney;
- Melbourne City Mission, Melbourne;
- Aboriginal ITeC, Adelaide College of TAFE, Adelaide;
- Technology Directorate, West Australian Government, Perth.

These and other organisations in Australia have a vision of ITeCs solving some of the problems of job-skill mismatch in information technology in their area while solving the problem of disadvantaged groups being further disadvantaged by the introduction of information technologies (Webb, 1985, p. 7). This vision will materialise with reasonable government funding at State or Federal level and the adoption of the type of strategy outlined here. The strategy has been successfully implemented in the U.K. and, more recently, in other countries. It is hoped that the preliminary moves in Australia will lead to full implementation of the strategy in Australia.

6.5 SOME POSSIBLE APPLICATIONS IN PEP IN VICTORIA

If an ITeC program is to be fully implemented in Australia along the lines outlined in the previous two sections, then we could expect to see, after three years of development, about eight ITeCs in the Melbourne area and about four ITeCs established elsewhere in Victoria.

To develop this scenario a little further, we could speculate on the type of programs that could be offered by these ITeCs. Two areas should be of high priority. Firstly, one-year traineeships in

- computing and software;
- the electronic office

should be offered to unemployed youth and disadvantaged school leavers in the age range of 15 to 24 years. Secondly, information technology education and training should be offered to similar groups undertaking PEP programs. The other parts of the PEPs would be undertaken at the nearby TAFE college or PEP centre.

The information technology component of mainstream TAFE courses could also be offered at some ITeCs but this should be a lower priority than the abovementioned two types of program, as the main raison d'etre of the ITeCs is the provision of information technology training to groups of disadvantaged young people. Other short information technology courses could be offered on an ad hoc basis according to the local community and industry demand. In many such instances it may be appropriate to charge a fee for the course.

The siting of the ITeCs requires careful consideration. Given the above scenario, there would be two main factors affecting the choice of sites. Firstly, priority should be given to areas of high youth unemployment. Secondly, priority should be given to sites close to TAFE colleges or associated centres offering PEP programs. PEPs are offered at about 32 centres in the Melbourne area and at about 27 centres in the rest of Victoria, therefore each ITeC should be sited strategically so that it is within reasonable travelling distance of four or five PEP centres. Even with such careful planning, some country PEP centres may not be within reasonable travelling distance of an ITeC, if only four ITeCs are sited outside Melbourne. Alternative arrangements for country PEP centres should be considered, including the possibility of mobile ITeCs.

As mentioned in the previous section, three 'pilot' ITeCs are about to be established in Australia with Federal Government funding. Regardless of which agency, Federal or State, funds and supports ITeCs, PEPs could and should form a part of the ITeC service, as suggested in this section.

Recommendation 3

It is recommended that Information Technology Centres should be established along the lines outlined in this chapter, and that the main target group for such Centres should be disadvantaged youth. Before establishing such Centres, there should be a short urgent study to make specific recommendations on:

- funding;
- location;
- types of program to be offered (particularly PEPs);
- links with the local community, industry and educational institutions;
- administrative arrangements;
- provision of ITeCs in country areas, including the possibility of mobile ITeCs.

CHAPTER SEVEN: SELECTED INDUSTRIES AND INFORMATION TECHNOLOGY

7.1 OVERVIEW OF RESEARCH FINDINGS

Information technology increasingly is becoming an integral part of our lives, both private and corporate. In 1984 Australians spent an estimated $4.8 billion on IT and it is claimed that that figure is going to jump to around $12.5 billion within five years (Maddocks, 1985). The array of information production is bewildering. There is everything from home computers and software to car telephones, pocket papers, desk top computers, office systems, solar powered links to the outback, videotex and electronic funds transfer.

With Aussat we can now expect improved nationwide communication, voice video and data transmission. Because of its flexibility and cost effectiveness, industry and commerce can be expected to use the satellite to establish high speed data links, document distribution, computer networking, facsimile transmission, centralised information retrieval and integration of voice, data and video communications. Already, for example, there are in excess of 10,000 registered videotex subscribers in Australia.

Videotex is being used for home shopping, home banking, access to business information, games, education and booking travel and accommodation. The travel industry now uses TIAS and Aftel to book airline and hotel accommodation. Aftel, which is run by the Australian Federation of Travel Agents, currently has about 500 agents using the system Australia wide and estimates that by June 1986, there will be upwards of 1200 agents using the service (Maddocks, 1985).

The airlines booking system TIAS (Travel Industries Automated Systems) now connects about 350 agents with its on-line reservations network which allows flights to be booked world wide. This service is expected to be expanded to another 100 agents by about the middle of 1986 according to TIAS officials (Maddocks, 1985).

While the organisations surveyed by the project team did not present as dynamic a picture of the use of the new technologies in industry as that of Maddocks, some interesting information was provided. An indication of the extent of use by the three industries was obtained by listing 14 areas of likely IT use. Each respondent was asked to give an indication of the extent of current use by circling a number on a four point Likert scale corresponding to:

- not used
- little used
- moderately used, or
- greatly used.

Respondents were asked also to comment on the likely future use in each area listed. The results are summarised in Table 7.1.

Although the three industry categories can be considered to be fairly diverse, their indicated pattern of use of IT is quite similar. The instances where there are statistically significant differences (at the 0.05 level of significance) in the extent of use among the three industries surveyed are in the following areas:

- personal/micro computers
- computer networks
- electronic mail
- word processing
- data bases on computers
- simulation.

In, all of these cases the extent of use in business/finance was significantly higher than that in either retail or hospitality/tourism.

Overall, the results lead to the conclusion that business/finance has the greatest range and extent of IT use and the retail area the least. Surprisingly, there was only one area of agreement across all three industries as to the nomination of an area of IT that would have increased use. That was the area of computer networks. All three industries nominated this as a growth area in their industry.

Other areas of IT that were being currently used, or were expected to be increasingly used, over the next few years were:

. retail	point of sale terminals electronic funds transfer electronic mail, information bulletins
. hospitality/tourism	videotex/teletext computer networks
. business/finance	on-line equipment computer networks electronic mail.

One interesting result that came through in the discussion with respondents was their agreement that while telex was currently used quite extensively in all three industry areas it was generally unsatisfactory. While there was agreement that telex would be (and should be) replaced, there was no agreement on what technology should replace it. Some saw it being replaced by facsimile, others by electronic mail systems.

TABLE 7.1

Extent of use of information technology in three industries (N = 19)

Area of use	Extent of use, represented by mean score*			
	Retail n = 5	H/T* n = 7	B/F* n = 7	Perceived Future increase in use*
main frame	2.8	2.0	2.4	H/T
mini computers	1.2	0.8	1.3	-
personal/micro-computers	1.8	1.4	2.6	B/F
keyboard input	1.6	3.0	2.8	-
optical scanning (print input to computer)	0	0.1	0.3	R
voice recognition & synthesis by computer	0	0	0	-
computer networks	0.2	1.3	1.8	R, H/T, B/F
information bulletin via T.V. (e.g. tele-text/view data)	0	0.4	0.6	H/T
telex	2.0	2.1	2.6	decrease H/T, B/F
electronic mail	0.2	0.8	1.3	B/F
telephone switch-board	3.0	2.3	2.6	-
word processing	2.0	1.6	2.7	H/T
databases on computer	1.0	1.6	2.4	-
simulation	0	0	0.6	-
programming skills	2.8	2.4	2.4	H/T
system analysis skills	2.6	2.4	2.6	H/T

Notes: 1. For extent of use: 0 = not used, 1 = little used, 2 = moderately used, 3 = greatly used.

2. Abbreviations: H/T = hospitality/tourism; B/F = business/finance; R = retail.

7.2 IMPLICATIONS FOR PARTICIPATION AND EQUITY PROGRAMS

The information obtained in order to provide the data for the analysis of the extent of IT use in the three industry categories in Section 7.1 was obtained from responses in which an attempt was made to identify the levels and job classifications at which these tasks would be performed. In order to obtain more precise information about IT skills respondents were asked to provide information about specific jobs. Each was asked to list the job title of up to three base level jobs within their industry. They were then asked to identify the level of competency required in seven different applications of IT skills. Four of these skills were provided on the questionnaire for comparative purposes and three left for the respondent to nominate.

Because there is an extraordinary range of job titles from managing director to base-grade clerk that respondents could choose from in all three industry categories, respondents were deliberately restricted to the consideration of base level jobs only. These were the types of jobs within their industry that PEP participants could readily expect to obtain.

The levels of IT skill associated with each job title was indicated by circling one of four letters in each instance corresponding to:

- A = no knowledge required
- B = 'literacy' required
- C = understanding required
- D = specific skills required.

Respondents were also asked to comment on the use of the indicated IT skill in relation to each job position. The results obtained are summarised in Table 7.2 for the business/finance industry where 16 base grade positions were identified. In this and the next two tables the numbers represent the number of base-level jobs.

TABLE 7.2

Distribution of computer software package skills for 16 base level jobs in Business/Finance

Software Package	Skill level required*			
	A	B	C	D
Wordprocessing	9	3	3	1
Spreadsheets	8	5	3	0
Data bases	8	5	3	0
Bookkeeping	7	4	5	0

***Note:** A = no knowledge, B = literacy, C = understanding, D = specific skills.

The results obtained for the hospitality/tourism industry where 17 base grade positions were identified are given in Table 7.3.

TABLE 7.3

Distribution of computer software package skills for 17 base level jobs in Hospitality/Tourism

Package	Skill level required*			
	A	B	C	D
Wordprocessing	13	1	1	2
Spreadsheets	16	1	0	0
Data bases	11	1	3	2
Bookkeeping	8	5	1	3

***Note:** A = no knowledge, B = literacy, C = understanding, D = specific skills.

The results obtained for the retail industry, where 11 base grade positions were identified are given in Table 7.4:

TABLE 7.4

Distribution of computer software package skills for 11 base level jobs in Retail

Package	Skill level required*			
	A	B	C	D
Wordprocessing	8	1	1	1
Spreadsheets	8	2	1	0
Data bases	7	2	2	0
Bookkeeping	7	2	2	0

***Note:** A = no knowledge, B = literacy, C = understanding, D = specific skills.

A general pattern was discerned in the IT skill requirements for the 44 base-level jobs over the three industries. Within each of the three industries, three types of base-level job were apparent, these being:

- word processing/electronic office jobs requiring IT skills;
- clerical/accounting jobs requiring IT skills;
- other jobs not requiring IT skils.

This result has important curriculum implications for PEPs, these being discussed in Chapter 10.

The above results, together with the fact that all except the organisations interviewed expressed a preference for their own in-house training (often in conjunction with hardware and software suppliers), at the sub-professional levels, bodes well for PEP participants. It indicates that the organisations interviewed are not seeking formal educational requirements in the use of the IT as yet. This means training received in PEP programs, providing it is of good quality, should prove effective in helping participants to gain jobs. During interviews with the organisations it was indicated repeatedly that some knowledge and skill in relation to the use of computing packages was desirable in job applicants.

What may not be so good for PEP however, was the fact that, with the exception of one organisation, all people interviewed were not aware of Victorian TAFE's PEP program.

CHAPTER EIGHT: THE FUTURE ROLE OF INFORMATION TECHNOLOGY IN PARTICIPATION AND EQUITY PROGRAMS IN VICTORIA

8.1 THE IMPACT OF INFORMATION TECHNOLOGY ON INDIVIDUAL PARTICIPANTS

Much has been written about the effects of IT on our society and the individuals within it. That the effects of IT are impacting on individual PEP participants (as indeed it does on all of us) would not be disputed by many. The simple fact that most PEP participants have been unemployed could be attributed at least partly to the organisational changes brought about in industry by IT.

It seems that every technological advance brings with it both advantages and disadvantages. Radio for example brought entertainment, news and warning of danger to people throughout the world. It has also been used as a tool for propaganda to inflame racial hatred and war. The motor car has allowed people to become more independent and mobile, yet thousands are killed by cars each year and the pollution caused through its use is a health hazard.

IT represents one of the most significant technological advances that society has made. The general view would be that these advances have resulted in both advantages and disadvantages, but that sensible planning will result in the most beneficial use of IT by society. IT is so widespread and potentially so pervasive and influential, that its inappropriate use could seriously disadvantage many in society.

It could be said that it is not IT that is complex, but the social issues that accompany it, such as unemployment, invasion of privacy, computer crime, quality of life and job satisfaction. These are issues which affect us all, but they can only be discussed intelligently through an understanding of the operation and potential of IT. This discussion on IT should involve everyone, not just those few 'experts' in the field pre-occupied with their own self-interest in the technology.

How are individual PEP participants affected? They are being affected in many ways: when they watch live television programs beamed by satellite from the other side of the globe; when they use Bankcard or other numerous credit cards; when they query an incorrect telephone account which is generated by computer and hence is usually considered to be correct; when they look for jobs which may have existed in recent, more stable industrial society, but no longer exist now that we are experiencing the beginnings of an 'information society'.

Participants are also being affected by the impact of IT on education because IT is affecting the way we think about education. It is bringing into question the nature, control and purpose of curriculum. Such issues as the need for curriculum to enable students to form critical judgments about, and to participate in, an information society, are given a sense of urgency by the widespread application of IT. More generally, technology compels educators to be more flexible and to ensure that students are more capable of responding to rapid social and technological change.

Recurrent education is a powerful, adaptive strategy that meets this challenge. It is a comparatively new phenomenon. In many ways, therefore, the greatest effect of IT to date on PEP participants (albeit indirectly) has been to make them reassess the educational process. Their willingness to re-enter the educational system after having left it, attests to this. PEP participants are thus among the few currently undertaking formal recurrent education, and in Victoria in particular they are among the pioneers.

8.2 INFORMATION TECHNOLOGY AS A PATH TO WORK

While at this stage in Australia there does not appear to be a discrete information profession, there is certainly a growing number of people in the workforce who, as a major part of their job, are engaged in the operation of information handling technology at the sub-professional level (Broadhead and Davis, 1985). In this context, sub-professional is taken to mean all levels below professional. Although largely engaged in IT at the sub-professional level, many are professionals in terms of education and non-IT aspects of their work. The work of the project team, while not broad enough in scope either to confirm or to deny the findings of Broadhead and Davis, certainly lends support to this contention. As there is no doubt concerning the growing relevance of IT to the professional levels of the workforce, a continuum of IT skills is being developed across industry.

Such a continuum of skills, because it is somewhat industry specific as well as hardware and software dependent, is presently not homogeneous and fully transportable across all areas of employment. This heterogeneity of skills requirements, together with the rapid development of both hardware and software, presents difficulties in terms of someone using skills obtained in IT as a means of gaining employment. However, in considering the totality of Information Technology skills, it is readily apparent that while in each industry there may be a predilection for certain types of skills, because the information itself can only be processed in a small number of different ways, the total number of distinct skills is quite small. This is supported by Figure 8.1, which shows the few processes involved in all IT applications.

What is likely to vary most from industry to industry is the type of information that is being dealt with and hence the preferred medium of production (as well as acquisition) which in turn determines the technologies employed. Thus, for example, if we look at some of the more important Information Technology applications as represented in Figure 8.2, we see that while optical scanning may be more applicable to the retail industry than say the business/finance industry which may rely more on computer networks (refer Chapter 4), the processes involved in both applications are, as illustrated in Figure 8.1, quite similar.

Thus at base level employment, where one is most likely to be involved in information handling (that is, ensuring the transfer of information from one point to another with minimal concern for, or control over, its actual content) a knowledge of the different technologies through which this is achieved gives a sense of control over the technology and a willingness to adapt to changes brought by the technology. Such knowledge should be of immense personal value.

Such knowledge can be largely obtained through practical training. It consists primarily of fluency in the use of telecommunications equipment and a basic understanding of computer related aspects. At the sub-professional level where there is an increased emphasis on the part of workers on the content of and generation of information, there is less concern for the telecommunications aspects of IT and more on the computing aspect. Here such skills as wordprocessing, using spreadsheets and data bases to generate information as well as other applications of computer technology for the generation of information are valuable, as well as information handling skills. It is currently estimated that about three-quarters of current end user computing is traceable to middle and lower level employees working in finance and administration (Gulden, 1985).

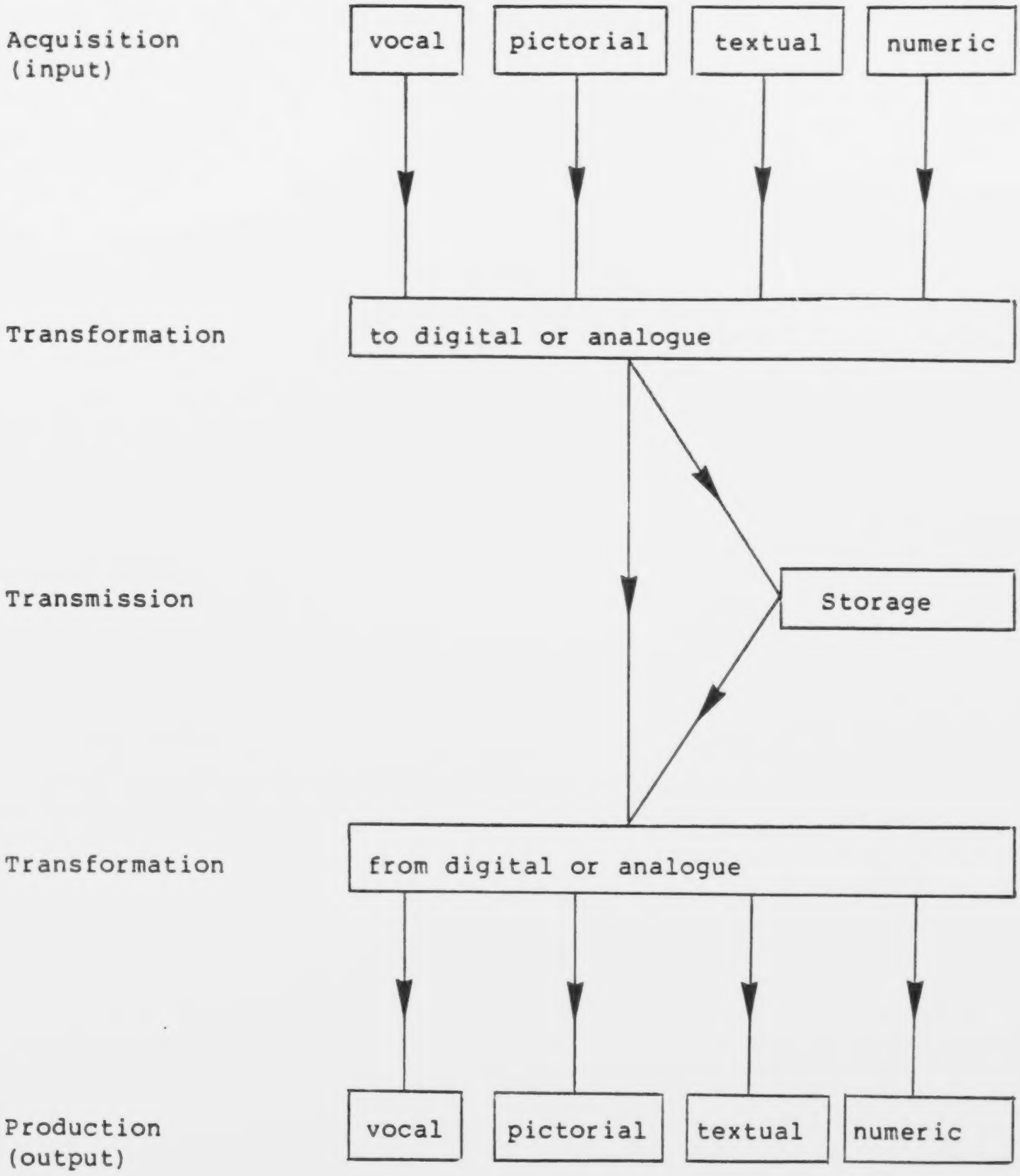
Acquisition (input)
vocal
pictorial
textual
numeric
Transformation
to digital or analogue
Transmission
Storage
Transformation
from digital or analogue
Production (output)
vocal
pictorial
textual
numeric

Figure 8.1: Processes involved in all information technology applications

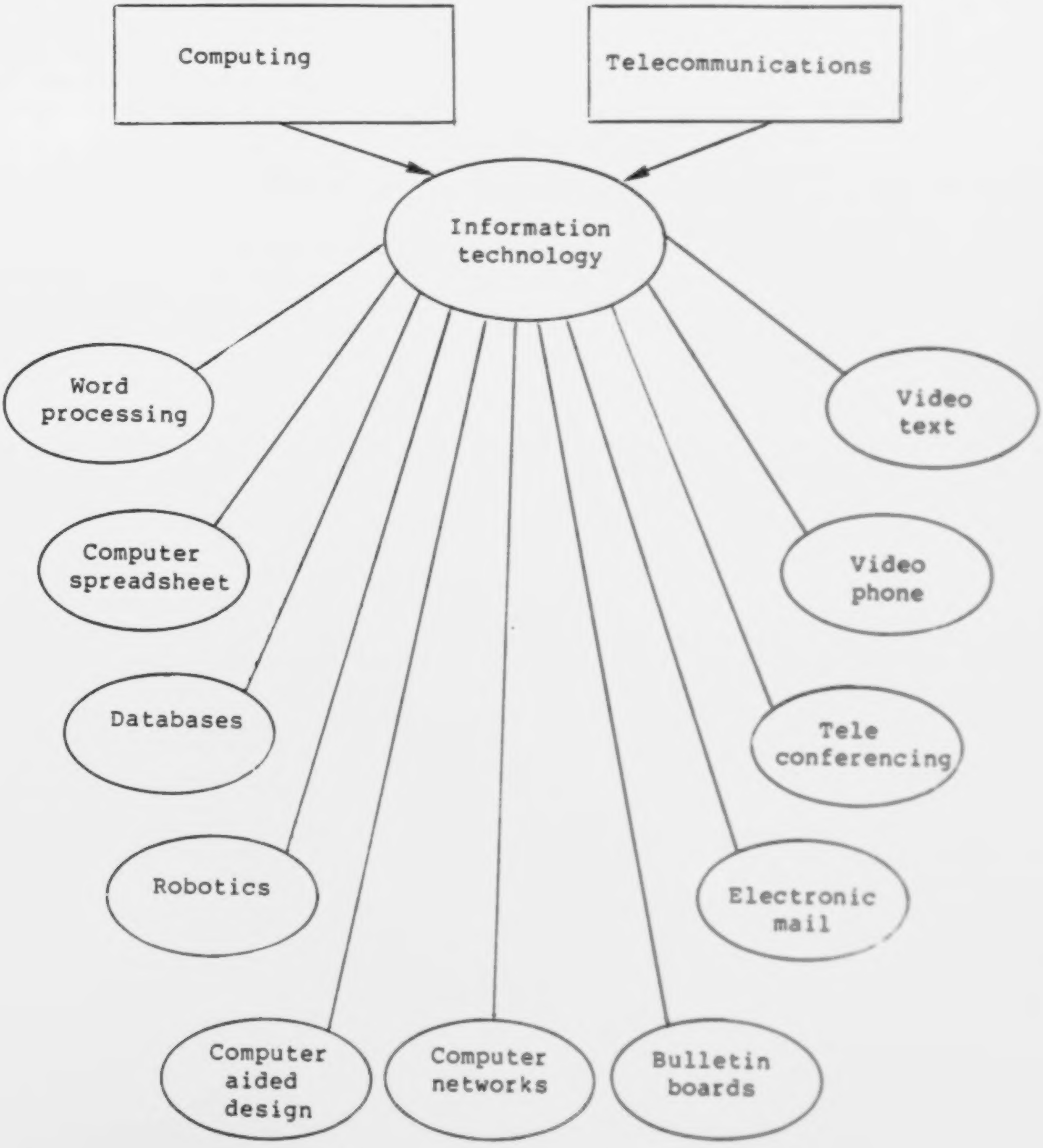
Computing
Telecommunications
Information technology
Word processing
Computer spreadsheet
Databases
Robotics
Computer aided design
Computer networks
Bulletin boards
Electronic mail
Tele conferencing
Video phone
Video text

Figure 8.2: Some of the newer computing and telecommunications manifestations of IT

At the professional and para-professional levels of employment there is a growing need for IT skills, but these skills are very much subservient to other skills possessed by the professional and are being used primarily for decision support (Canning, 1985).

Information, and the handling of information, are yet to be regarded as a separate entity, but is still seen as the means to an end, determined by the industry which gave rise to it. This causes people to perceive themselves principally in terms of the industry in which they work and to think of the information skills that they have as an adjunct (albeit a useful one) in performing their roles, even if their role is primarily one of information dissemination. Very few people performing IT tasks, therefore, yet see themselves as information workers (Broadhead and Davis, 1985). The colleges and employers of these information workers also have this perspective.

This, therefore, provides PEP participants with no clear career path as information workers (at the present time). This fact does, however, provide PEP participants with certain benefits should IT training be included as part of the PEP curriculum. The first benefit being that, because there are as yet no recognised information workers, formal training programs have not been established in the area. Most firms presently appear to have a preference for in-house training (refer Section 7.2). Consequently, any training that PEP participants obtain in the area through an IT curriculum is likely to be given de facto recognition by employers. In a recent issue of E.D.P. Analyzer (p. 14) It was stated that:

> Training continues to be a major subject of discussion. Initially, computer literacy was the top topic, but advanced training on using tools is now the leading concern. Computer-based training provides only a partial answer . . . The backlog in information centers is not undeveloped systems waiting in a queue; rather, it is untrained users waiting to be taught to use the tools.

In effect, therefore, a little training in IT should have a marked effect.

The second benefit is of a longer term nature and springs directly from the first. Because a little training will go a long way, the initial stages of this training can be based upon practical training. This can in turn lead to more theoretical forms of study in tandem with practical experience which in turn can induce in the student (PEP participants) the confidence to undertake further learning in the area of IT learning in PEP and mainstream TAFE educational programs. This may result in PEP participants entering the educational system via the path of recurrent education and hence entering a skilled occupation.

8.3 INFORMATION TECHNOLOGY AS A PATH TO FURTHER STUDY

At the end of the previous section it was suggested that the inclusion of an information curriculum in Participation and Equity Programs could serve as a path to further study. There are essentially three ways in which this can be done:

a) IT can be used as a stimulus to trigger or rekindle interest on the part of PEP participants in education. Here the philosophy is similar to that of the British ITeCs where the philosophy was to:

> . . . set up a rich learning environment within the new technologies. This would cover electronics, process control, robotics, programming, data base management, view data, electronic office and CAO/CAE. As an area of training, it was underpinned by two radical premises. One, that for the young unemployed there would be no necessary academic pre-requisites for entry into what is often seen as a prestigious area of training. In our case in London, most of our trainees are both unqualified and black. Two, the nature of the training/learning would be 'hands-on'. . . . 'hands-on' does not mean non-theoretical! Far from it - it is merely a different and, we would argue, a more effective and interesting way of illuminating both the theory and practice of the new technologies. Over the whole national program, we have achieved approximately 70% job or Further Education placement in skill-related areas. (Webb, 1985)

In the case of PEP the critical aspects of using IT are that it is a prestigious area and it lends itself to a practical approach.

b) IT can also be used as a path to further study because of its relevance to so many different areas of study. The fact that IT is so crucial to our technological society, means that courses of study at all levels are including, or considering including, some aspects of IT in their syllabus.

If, therefore, the content of an IT syllabus in PEPs is such that it can become the starting point for ultimately obtaining credit in IT-related units of various TAFE vocational courses, PEP will be indeed offering participants a path to mainstream education. Such a path could be:

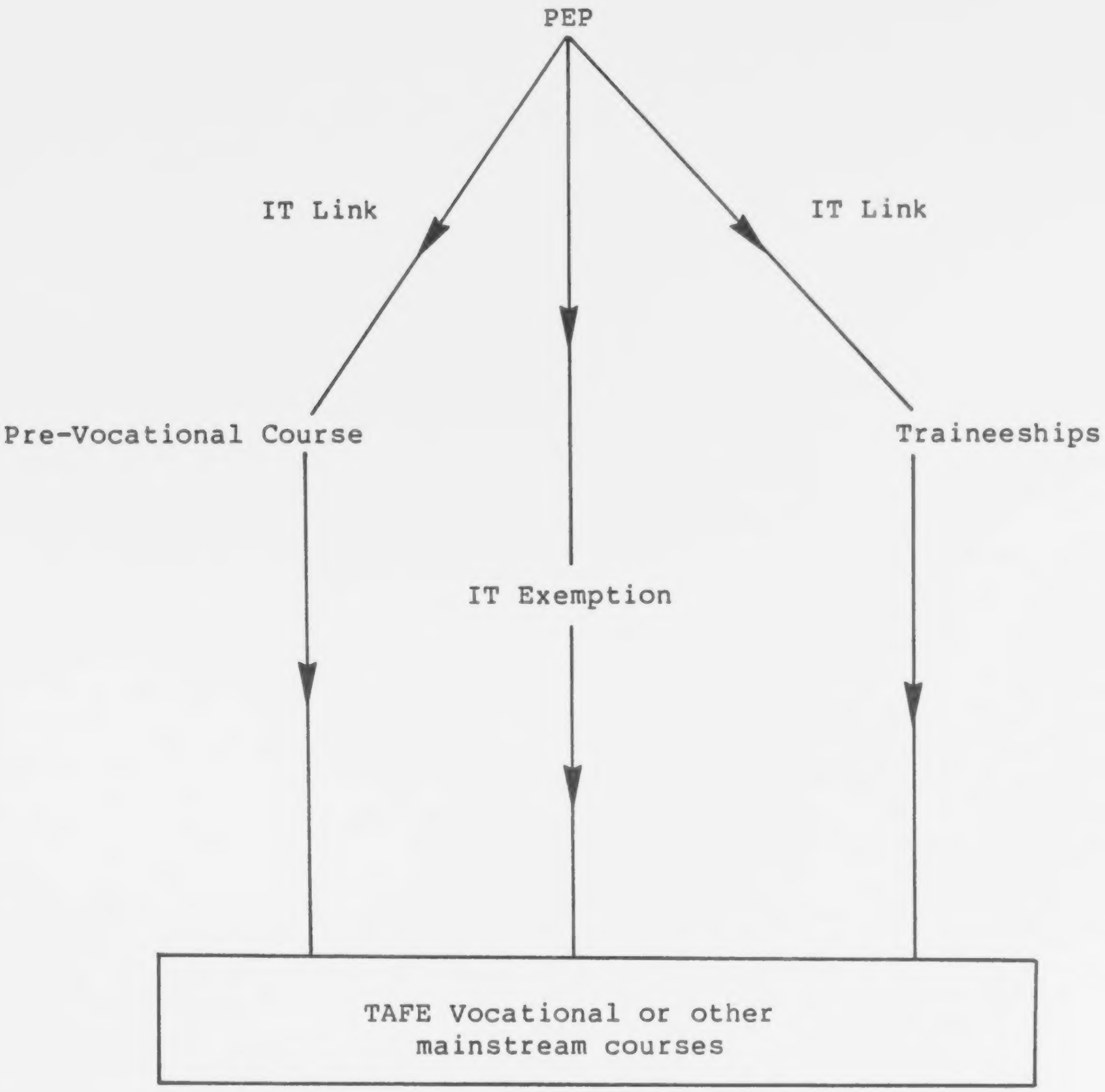
PEP
IT Link
IT Link
Pre-Vocational Course
Traineeships
IT Exemption
TAFE Vocational or other mainstream courses

Figure 8.3: PEP as a path to mainstream education

c) Exposure of PEP participants to various items of new technology hardware and software will help them to not only use them routinely, but will also mould their thinking to the logic of the computer functions behind their operation. This issue is explored more fully in the next section.

8.4 INFORMATION TECHNOLOGY AS A TOOL IN LEARNING

Technology can be used to deliver and test the acquisition of knowledge by a learner. The use of a computer for simulation, drill and practice would be an example of this. Much of the early commercial educational software falls into this category. This is probably the easiest way to incorporate the technology into learning.

The technology can also be used to function as a means of obtaining or analysing data. Here the technology can be used to access information bulletins such as Telecom's Viatel or outside data bases such as the National TAFE Clearinghouse. In this way, the learner can obtain information that would otherwise be inaccessible (or difficult to obtain). This technology can also analyse data either by means of commercially available software such as spreadsheet, data base and graphics programs or by learner (or teacher) generated programs. Perkins (1985) calls this the 'first order fingertip effect', whereby IT has placed information at our fingertips.

The final (and most contentious) way in which IT can be considered as an educational tool is through its actual use. Some would say when IT is used it presents opportunities for better thinking and learning. Perhaps the best known proponent of this is Papert (1980), one of the inventors of the computing language Logo. How might such opportunities accrue? One example is 'turtle graphics' a mainstay among Logo programming activities. In the process of programming fields of flowers or abstract designs, learners may pick up certain notions about angle and distance, shape and line, with relevance to mathematical understanding.

Beyond questions of content and language, engagement in programming might impart concepts of scope and power such as the notion of a 'bug'. Carrying a procedural perspective from programming activities to other tasks like writing a personal resume, or learning to budget, the learner might analyse the procedural demands, devise a program-like strategy and 'debug' it on the basis of programming experiences. Similarly, data base programs present an array of information that allows the learner to enquire about a topic far more flexibly than in a library. Classification and cross-classification is a powerful intellectual tool. Using a data base offers the promise of such a learning transfer to the learner.

Such possibilities are advocated at even simpler levels of application of IT in the classroom. Current opinion is that students with access to a micro-computer spend more time studying and solving problems, and that those students who write at their keyboards, compose more freely and revise their work more thoroughly than those who do not (Johnson, 1982). The gains that can be made in the video game arcades, however, can never approach those outlined above, no matter how much time is spent playing. Computer or IT literacy cannot be confused with 'arcade literacy'.

8.5 INFORMATION TECHNOLOGY AND PEP

The important result of the industry survey is the indication that many base level jobs require knowledge of the use of computer software packages, and a few of these jobs require specific skills in the use of software packages. There is also every indication that knowledge of computer software packages will be required in an increasing number of base level jobs.

It is currently estimated by the U.S. Labor and Commerce Department that by the end of the decade, 50 to 75 per cent of all jobs will be computer related (Johnson, 1982). It is not unreasonable to expect a similar trend in Australia. In factories, hospitals and other labour intensive sectors of the economy, robots are expected to take over many of the risky or repetitive chores now performed by humans. Clearly, the job applicants most qualified to perform the growing number of high technology jobs that are appearing on the horizon are likely to be ones with the appropriate IT skills. The unskilled jobs, historically filled by new immigrants and those at the bottom of the economic and education ladder, will all but disappear. To compete for tomorrow's jobs, the youth of today must become familiar with computers and their associated technologies.

Already in offices and factories, computers and their associated technologies are bringing dramatic changes in work patterns and productivity. The results of the project team's questionnaire show that already employers are expecting some knowledge of computers for base level jobs. Thus whether one works with computers or not it is important to become 'computer literate' as the computer and its associated technologies will permeate the whole world of work.

The project team therefore recommends that all PEPs include a core curriculum in IT. The core curriculum should allow PEP participants to achieve computer literacy. Computer literacy is a term frequently used in education literature, and may be defined as having a knowledge of the computer (including its terminology, its applications in work and the home, and its social implications) and having an ability to interact with a computer to perform particular functions. Details of the recommended IT core are given in Chapter 10.

PEP staff must also be aware of another major trend. Students now in primary and secondary schools can be expected to acquire considerable computer experience. Today's school leaver has increasingly been taught a computer literacy program even beginning in the primary school level and perhaps has been introduced to a programming language such as Logo. If such a student has completed years 11 and 12, he or she may even have taken computer science. The Federal Government's 'computers in schools program' has been a major influence in this. PEP participants, however, with an average age of 19.3 years (1985 PEP Census) will largely have gone through school deprived of computer exposure. Therefore, unless something is done to rectify this (through programs such as PEP), we may see a generation of men and women cut off from a fundamental part of the next generation's experience. This could be reason enough to provide computer literacy to the current generation of PEP participants.

Education is expected to play a key role in unlocking the benefits of this new technology. Supporting the advance of the technology has been research and development and the involvement of highly trained experts. It is our educational institutions that are expected to educate the IT illiterate. PEPs must share this responsibility as much as any other educational program. The project team believes that enough evidence has been gathered in the preceeding pages of this report to show that something must be done. What then must PEP programs do?

The project team believes that there are four key goals that PEP programs should be aiming for. First, **programs should be seeking to establish effective instructional sessions that will produce computer literates.** There are two related sub-goals to this. To begin with, it is necessary for individual PEP programs to know what they want their participants to be able to do, what they want them to know and how they want them to feel about the new technologies. In addition, it is necessary for programs to determine an instructional program that will enable them to achieve their goal of producing computer literates.

Second, **programs must provide the facilities, resources and personnel to support these instructional sessions.** This is not a simple task. There are several dimensions to this task. One of these relates to hardware: What kind of mix of hardware should programs be looking for? What brands? How should they be interconnected, when and where should students have access to the equipment? Another dimension relates to software. What kind of software should programs make available to participants? Should there be wordprocessing, data analysis, spreadsheets, etc., available? Furthermore, does the program have the resources, facilities and personnel it would like to support presentation of the issues.

The third goal is very closely linked to the second, that is, **programs should strive to use effectively and manage the IT resources they have available to them.** The fourth goal that programs should be aiming for is **to make staff computer literate.** This involves all staff members establishing a certain degree of comfort with computers and computer-related technologies, and becoming active users of new technologies.

There will be many obstacles encountered by PEP program staff in attempting to meet these four goals, money and time being two very obvious ones. It is the belief of the project team however that the greatest obstacle will be the ambiguity of the term computer literacy.

Each PEP program will need to deal with the concept of computer literacy in its own situation. It will depend upon the kind of program run, the kind of participant the program is targeted to and the kind of exit participant that the program hopes to produce. What can be done by programs and what program content can be included is discussed in the next two chapters of the report.

Recommendation 4

It is recommended that all PEP programs offer a program of study that introduces participants to the nature and workings of IT.

There are four key goals that PEP programs should be aiming for:

1. Programs should be seeking to establish effective instructional sessions that will produce computer literacy.
2. Programs must provide the facilities, resources, and personnel to support these instructional sessions.
3. Programs should strive to use effectively and manage the IT resources they have available to them.
4. Programs should ensure that teaching staff are computer literate.

CHAPTER NINE: TEACHING THE SOCIAL IMPLICATIONS OF INFORMATION TECHNOLOGY

9.1 INTRODUCTION

Consider the following predictions for Australian industry:

- by the end of this century, all essential production could be done by 10% of the workforce;
- by the end of this century, 80% of all workers could be employed in information industries;
- 97% of all knowledge in the world's history will have been acquired during the lifetime of today's students;
- the majority of people presently working will be doing a different job by the year A.D. 2000; many of the jobs they are presently doing will have been scrapped completely;
- entirely new jobs will be created, such as robot psychologists, leisure consultants and computer education specialists by the end of this century. Information occupations will continue to grow at a massive rate.

Predictions such as these indicate the nature and scope of the present industrial and social revolution. The world has experienced such revolutions in previous generations as Figure 9.1 shows in a later section of this chapter. The two main differences between the present information and communication revolution compared with the previous five revolutions are, first, the present revolution is displacing the brain (whereas previous revolutions displaced muscles) and, second, the speed of the present revolution is far greater than the speed of the previous five. Indeed, it seems likely that rate of change is such that a seventh revolution could be experienced by many people who are alive today.

Bernal (1965) has proposed three general social implications arising from the present scientific technical revolution. These are:

- changes in production or labour forces;
- changes in the structure of the economy and in labour;
- changes in the role of the State.

These are discussed in depth by Benson and Lloyd (1983). The first of these changes is now common knowledge and the predictions given at the start of this chapter are based on an assumed continuation of this change.

The second change (in the structure of the economy and labour) is already being experienced by industrialised nations such as ours. For example, the international car with components made in different countries is already being assembled. (The engine is being made in Australia.) Many believe that Australia will need to be a member of the international assembling and marketing in the future.

The third change (in the role of the State) has increasingly seen governments becoming involved in national decisions affecting technological change.

Already, it must be obvious that the curriculum of any TAFE course which completely ignores the social implications of technological change is doing its students a great disservice. The next section of this chapter discusses why the teaching of social implications is especially important for the teaching of IT. The rest of the chapter summarises the main approaches to teaching about social implications, warns of dangers to be avoided and then provides some examples of what to teach.

9.2 WHY TEACH SOCIAL IMPLICATIONS?

In the early days of electricity, it was known for families to keep a pair of rubber gloves hanging next to a light switch. The gloves were worn when the electricity was switched on, because of the fear of electricity. Nowadays, we are amused by such ignorance. Nevertheless, similar ignorance abounds in the area of IT. For example, the computer is blamed for mistakes; and the computer is feared as a god instead of being employed as a slave. Many workers are afraid that they are going to be displaced by a computer.

One of the main reasons, therefore, for teaching about the social implications of IT is in order to dispel ignorance. Almost all jobs either now have, or will shortly have, an IT component to them and so to understand the main features of IT, together with the social implications arising from the introduction of IT, must form part of the core of any course.

Ignorance frequently leads to fear; and fear can lead to industrial action. When jobs become affected by IT and workers do not understand the social implications of these changes, quite naturally they become fearful for their futures. TAFE has a responsibility to prepare people for such changes by teaching about the social implications of IT.

Ignorance can sometimes produce unfortunate consequences. Word processor operators because of ignorance of correct posture, can receive repetitive strain injury. An operator's ignorance of the capabilities of IT can lead to wasteful procedures and a consequent loss of time.

Perhaps the main reason for teaching about social implications is so that people can be in control of their own destinies. They then control the machine instead of the machine controlling them. And when changes are made to the machine (or if the machine is scrapped) then they will understand the reasons for this and more willingly undergo retraining.

Unfortunately, our educational systems have not generally attempted to teach about the social implications of technological change. Therefore, it is recommended that all PEP's do this in the future.

Recommendation 5

It is recommended that all PEP's should include some teaching about the social implications arising from the impact of IT.

Also, unfortunately, few TAFE teachers have themselves been trained to teach the social implications of technological change. Indeed, the teaching approaches frequently adopted in colleges, where highly specific objectives are to be attained, are not useful in the social sciences. Therefore, in-service training of teachers in both the process and the content will be required.

9.3 APPROACHES TO TEACHING SOCIAL IMPLICATIONS

The questionnaire distributed to Victorian Colleges asked for information about any courses which included social implications materials. No college sent any information, indicating that the development of materials is not (presently) considered important in PEP courses.

The TAFE National Centre's report on the IT component of traineeships (Hall et al., 1985) included a short section on what to teach. This is reproduced below.

The social implications of IT can be taught historically, conceptually, as a problem solving exercise, or just by means of practical examples or case studies of technological innovations and their impact on society, to enliven more theoretical teaching. The historical approach could, for example, show that the present technological revolution is part of a progression. This progression is shown in Figure 9.1 below, with the other revolutions being indicated. The difference between the present revolution is that it extends the human brain also, whereas all of the other revolutions produced ways of increasing the efficiency of muscle power only.

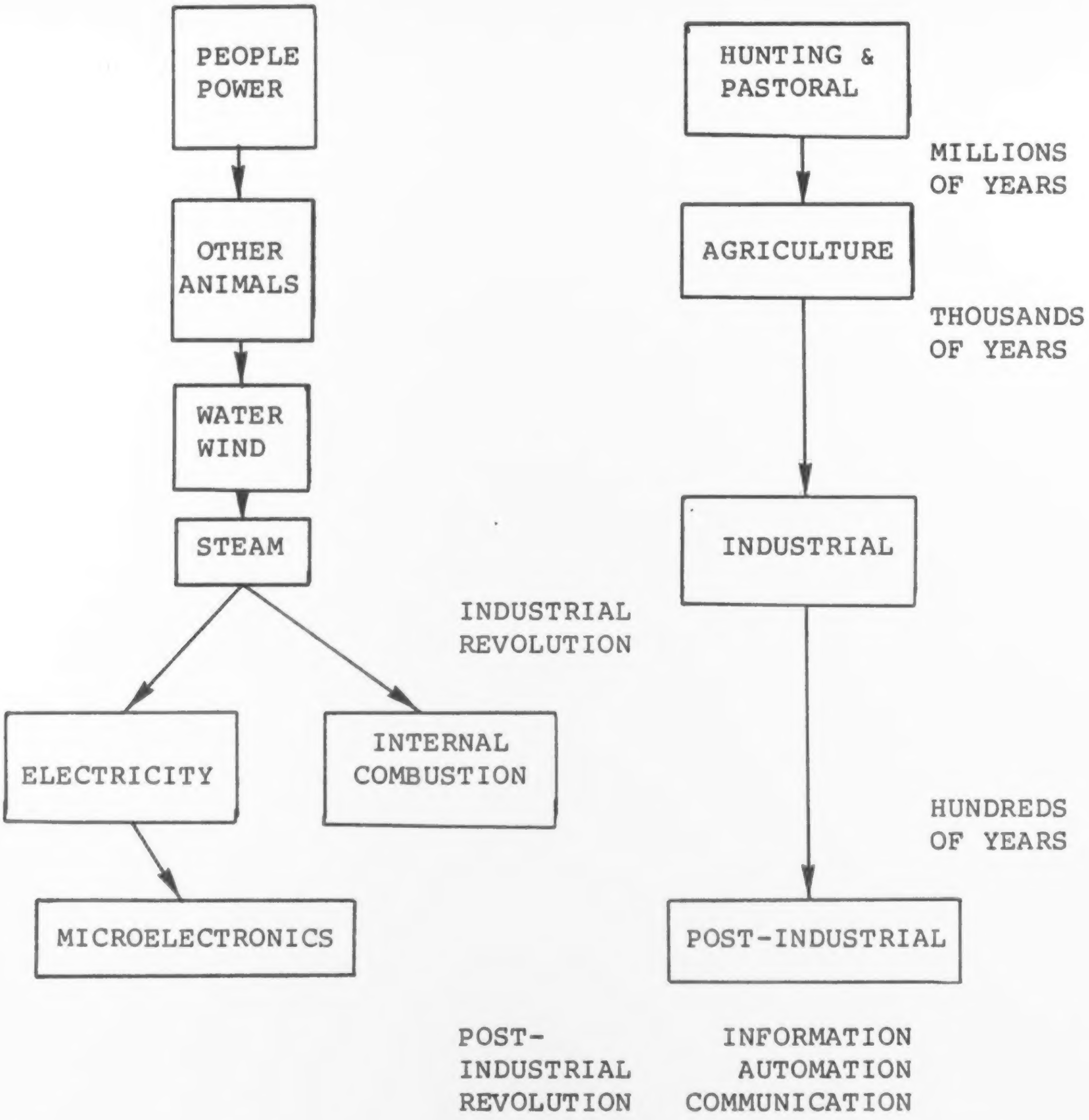
PEOPLE POWER
OTHER ANIMALS
WATER WIND
STEAM
INDUSTRIAL REVOLUTION
ELECTRICITY
INTERNAL COMBUSTION
MICROELECTRONICS
HUNTING & PASTORAL
MILLIONS OF YEARS
AGRICULTURE
THOUSANDS OF YEARS
INDUSTRIAL
HUNDREDS OF YEARS
POST-INDUSTRIAL
POST-INDUSTRIAL REVOLUTION
INFORMATION
AUTOMATION
COMMUNICATION

Figure 9.1: Technological revolutions

> The content of the social implications component should include the effects of IT on the labour market, and the implications for training and retraining. Occupational health and safety need to be included. The implications for communication between computer literates and computer illiterates need to be discussed. There are numerous, everyday areas where IT in society can be used, including banking, engineering, motor care maintenance, retailing, office work, and so on.

The above technological revolution example could have been approached in a different way, as shown below:

Speaking→writing→printing→telecommunications→microchip.

State departments produce reports on technological change, part of which make useful resource materials. For example, the South Australian Council on Technological Change has produced a series of Technology Appraisal booklets. A case study from their title 'Automation: Robots in Manufacturing Technology' is reproduced below (from pp. 22-23).

CASE STUDY--COMPANY "A"

The Company and what it does

This company, employing approximately 720 persons, manufactures metal (including diecast) components and assemblies for the automobile industry in South Australia.

The old diecasting process

The old method of diecasting components was labour intensive, requiring casting operators at the diecast machines and manual trimming and fettling operations. Transfer of castings from the casting machines to the trimming machines was carried out manually. As well as being labour intensive, the original process offered a disagreeable environment for the operators. Dirty work, high temperatures, and the resulting operator fatigue generated high absenteeism and labour turnover. The nature of the manual tasks was such that the making of unclean castings could not be avoided and subsequent washing operations were required. Productivity was low. The diecasting factory ran on a three shift basis.

The need to meet increasing market demand for its diecast products necessitated the company to relocate its diecasting operations in a section of a new factory. This decision provided an opportunity for review of existing procedures.

The new diecasting process

Two interlocked systems each comprising a Weingarten diecasting machine, a trim die, and a PRAB robot are used in the new diecasting area. The cycle of operations is:

- diecasting machine opens
- robot transfers casting to trim machine
- diecast machine closes, trim machine operates
- diecast machine opens
- etc.

The new process requires 50% less labour than the old process. Higher productivity, more consistent product quality, and a greatly improved work environment resulted from the change.

Implementing the change

The company has a policy of providing information describing planned changes to all personnel including trade union representatives and inviting comment before proposals are approved by senior management. A plant layout committee comprised of the area manager, the foreman, the manufacturing manager, and the plant manager meet to iron out perceived problems in any suggested plan to change operations. A large-scale drawing of the proposal showing machine layout, personnel tasks, etc., is then made and displayed in the immediate area where the change is to occur. Attached to the drawing is a comment sheet and all personnel are encouraged to add critical comment to the proposal. This procedure is adopted before the proposal is put to senior management for approval. On gaining approval, the plan is then described to all persons involved by the responsible foreman. Valid objections are discussed and changes may still be introduced at that stage. At the time of actual implementation, the full team of all personnel is assembled to participate to reduce risk of error.

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In the case of the two robots, the above procedure was followed. The operators displaced were assigned to different tasks. No industrial relations or technical problems were encountered. A six month training programme for personnel from the foreman level to operator level was undertaken.

The result

As a result of higher efficiency obtained in the die cast department, the company acquired in excess of 2,000 hours work for 1983 in casting, additional to normal requirements. With automatic casting, new technology in die design has been fostered and diecasting is a 'growth' area in the plant.

The future

Future requirements in die casting components will involve finer toleranced parts. Manufacture of these parts will include robot machinery having enhanced placement accuracy. The successful application of robots in the diecasting factory has encouraged thought of future applications in other areas when appropriate.

Daily newspapers frequently include stories which can be used when teaching about technological change, and science/technology journals are a good source for such material. Appendix D gives examples of newspaper extracts.

It is important to plan for the teaching of social implications. This will entail including some social implications course aims. One approach to planning is illustrated in the chart shown below. It is taken from the United Kingdom Further Education Unit's publication 'Computer Literacy 2, Unit 2, Core Materials'.

TABLE 9.1

COMPUTER LITERACY MODULE: THE WORLD OF WORK

MODULE H3 THE WORLD OF WORK

COURSE AIMS AND OBJECTIVES

Aim 1 Objectives: The student will be able to:
(i) use a simple predefined computer vocabulary correctly, both verbally and in writing
Aim 5 OBjectives: The student will be able to:
(i) identify and describe a specified number of the main areas of information technology in use or under development
(ii) describe a specified number of the social implications of information technology for work, leisure and the home
(iii) realistically assess his/her potential for obtaining employment with the skills developed in the computer literacy course

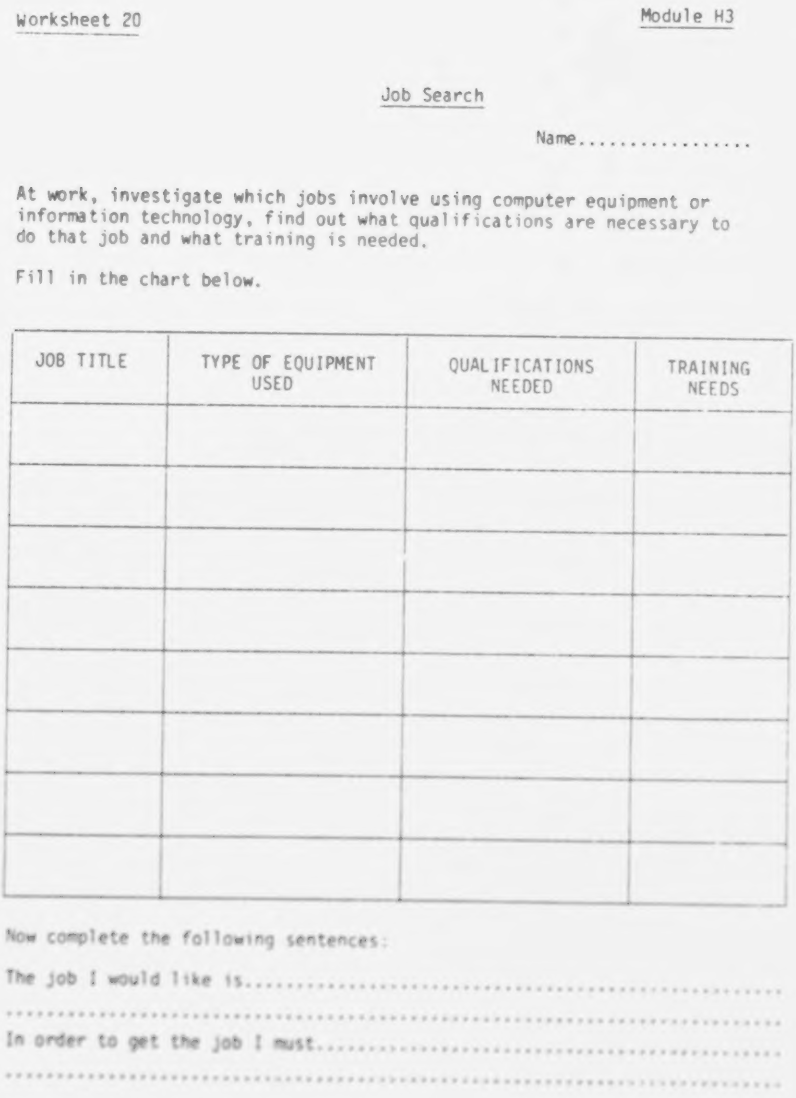
MEMORY	UNDERSTANDING	DOING	STRATEGIES/ACTIVITIES
Relevant vocabulary from previous modules	Relevant concepts from previous modules	Responding to Q/A or other methods of review; revising previous material	Introductory review by either Q/A, group work or computer check-test
Vocabulary related to computing jobs	How computer technology relates to the world of work	Contributing experience of work and computers to group discussion	Discuss jobs to be found in the computer industry or related fields, using students' experience during the course and at work/in job rehearsal
Job vocabulary	The features of particular computing jobs	Completing worksheet	Student activity to work in groups filling in worksheet 20. Some parts may be filled in initially by the teacher. Plenary session
Job vocabulary	The relevance of information technology to job aspirations	Contributing to group discussions	Exposition and group discussion to map out on the board a typical working day in the life of someone affected by information technology. Relate work covered during the course to students' own job aspirations
			Period of practice/project

BEST COPY AVAILABLE

TABLE 9.1 (CONTINUED)

MODULE H3 THE WORLD OF WORK

Key vocabularly	SYSTEMS ANALYST DATA CONTROL CLERK PUNCH OPERATOR
Resources	Worksheet 20 'Job search'
Assessment	Filling in worksheet



Worksheet 20

Module H3

Job Search

Name.................

At work, investigate which jobs involve using computer equipment or information technology, find out what qualifications are necessary to do that job and what training is needed.

Fill in the chart below.

JOB TITLE	TYPE OF EQUIPMENT USED	QUALIFICATIONS NEEDED	TRAINING NEEDS

Now complete the following sentences:

The job I would like is...
....
In order to get the job I must..
....

TABLE 9.1 (CONTINUED)

Project 12 | Module H3

A computer job

PURPOSE:	To investigate and record details about a particular type of computer job
TIME ALLOWED:	3 hours
ABILITY NEEDED:	General computing knowledge from course
RESOURCES:	No special resources
PRESENTATION TO STUDENTS:	i) Student to choose appropriate job, with guidance from teacher ii) Investigation of what is involved in the job selected; if possible, someone holding such a job should be visited, consulted and asked a prepared list of questions iii) Preparation of illustrated project report
ASSESSMENT:	Investigation Project report

Dangers to avoid

There are three main dangers to avoid when teaching social implications. First (as mentioned above) few TAFE teachers are familiar either with the content to be taught or the teaching approaches required. Therefore, there will be a temptation to treat the social implications as a discrete unit to be taught by a 'specialist'. It cannot be stressed too strongly that the social implications should be integrated within the IT content. Then it will be seen to be relevant and important, not something added on to the main course, if time permits.

The second danger is to use the teaching of social implications to get across a particular prejudice or personal point of view. While teachers should always be honest and open about their opinions, there is generally a number of different points of view and all of these should be given expression. It is not the teacher's task to persuade the class that a particular opinion is the right, or best, one.

Thirdly, the teaching of social implications must be planned as carefully as the rest of an IT course. This was discussed in the previous section.

CHAPTER TEN: INFORMATION TECHNOLOGY CURRICULA IN PEP PROGRAMS

10.1 INTRODUCTION

Through a process of interviews and survey of both PEPs and nominated industries, an overall curriculum framework and three content outlines have been developed.

The curriculum framework development has taken into account:

- the terms of reference of the project;
- the enormous diversity of programs in Victorian TAFE;
- the vastly different resources (e.g. staffing, equipment, accommodation and time) that are available to programs;
- that many programs have a particular thrust which may be either industry specific or client specific.

An earlier Centre report (Beasley and Beasley, 1985) described the 'ideal type' of curriculum development for the group of students under consideration in this report. This is reproduced below.

> Any educational provision intended to service specific target group(s) needs to develop curricula which:
>
> - acknowledges that specificity in terms of its cultural, social, economic and political position;
> - gives to that target group(s) extensive information concerning the circumstances which led to the establishment of the provision, what is being offered through the provision at specific locations, and how these offerings reflect the aims of the provision;
> - is offered within an agreed upon and cohesive framework, which has as its main focus a development which is appropriate to the specific needs of participants and aims to inform and empower students socially, culturally, economically and politically;

- explores enrolling students' prior knowledge and experience and incorporates their existing skills and talents;

- is integrated with and not isolated from the social context of which the curriculum development is an integral part, for example, the local community;

- includes an educative aim to improve students' economic, political and technological literacy which can be applied in micro-studies of the local community and includes an extension to a macro-context;

- promotes the learning of all skills in an integrated program where such skills are applied in holistic rather than fragmented learning situations, particularly in terms of dissolving the limitations of the mental/manual dichotomy;

- encourages responsive development by incorporating collective and individual student participation in all aspects of content, organisation, direction and evaluation in the course in which they are enrolled;

- places stress on the development of collaborative and collective learning situations where co-operation rather than individualistic competition is valued;

- allows all aspects of curriculum to be subject to conscious, critical scrutiny and analysis by all participants in terms of its value, not only to individual participants but also to society as a whole;

- consciously seeks to uncover the social causes of any inequality which affects the lives of participants and attempts not to perpetuate such inequalities in its intentions or practices;

- develops orientation programs for both students and teachers and incorporates a closing down phase which facilitates exit and promotes maintenance after exit;

- includes several forms of evaluation to be used for different purposes so that policy is continually informed by practice, and that practice is informed by formative evaluation;

- develops assessment procedures which are congruent with the educational intentions and do not contradict those intentions;

- permits accreditation which allows easy access to the greatest possible variety of educational and training programs, as well as employment possibilities. In order for this to happen, such accreditation must have legitimacy in the wider community;

- requires staffing from groups of people who are likely to be empathetic with as many as possible elements of the target group characteristics and who have knowledge and experience in those areas most likely to support the ideal type of curriculum; for example they should be not merely economically, politically and technologically literate, but they should also be knowledgeable in these areas;

- requires that such staffing have industrial security to provide continuity and cohesiveness;

- requires that such staffing receive overt recognition and support and ongoing developmental services;

- permits reasonable autonomy, as required by participants in any specific development, from established traditions and institutions.

As with any ideal, the practical application of this curriculum framework to any specific course would be constrained, modified and adapted in becoming curriculum-in-use. However, it could provide curriculum objectives which were closely linked with the social realities experienced by participants in a world of rapid change. Also, it must be remembered that much of this 'ideal type' of curriculum development is built from the recommendations of transition teachers who, in their own practice, attempted to implement such intentions. (pp. 166-68)

Specific PEPs have varying elegibility requirements but overall the participants:

- are early school leavers;
- have been unemployed for a long period of time;
- have negative attitudes to schooling;
- have poor literacy and numeracy skills;
- are in need of preparatory work to gain employment and/or entry to further education.

The development of the participant as an individual is the overriding concern of PEP staff and is supported by the aims and objectives of specific programs. This is evident, in practice, by the philosophy of 'starting where the participant is'. Just as participants are not in the same place at the beginning of a program, it is likely that they will be at different places at the end of the program. A teaching/learning environment that recognises the attitudes of participants about 'school' is initially imperative.

The average age of participants in 1985 was nineteen years. Most of them had not had any opportunity to use computers and associated technologies, either during their school years or subsequently.

Staff need to be empathetic with the personal situation of the participants and see IT as a valuable component of the program.

Assessment procedures should reward progressive achievement.

Where possible, IT content should be integrated into the overall program and a practical approach should be used.

Before making specific recommendations on IT curriculum content, it will be useful to summarise the relevant key findings of the literature review, PEP surveys and industry surveys, upon which the curriculum suggestions are founded. These are:

- IT awareness is necessary for all members of our society to understand the possible personal, social and career implications of the IT as may be reported in our daily papers. In other words, IT awareness will become a 'life skill'.

- IT awareness is becoming increasingly important in base-level jobs, even in those jobs not requiring specific IT skills.

- there should be an IT core curriculum incorporated in all PEPs.

- base-level jobs requiring specific IT skills are usually filled by largely untrained workers receiving on-the-job training.

- some IT tasks that could and should be performed by base-level workers are being performed by technical or professional workers.

- some PEPs should prepare participants for those base-level jobs requiring IT skills.

- such programs should include training in practical IT skills in addition to those covered in the IT core curriculum.

- those PEP participants wishing to enter mainstream courses, depending on the particular mainstream course, may need to undertake study in IT beyond that included in the IT core curriculum.

Most of the above findings have been represented diagrammatically in Figure 10.1. This figure outlines the relationship between the three types of IT curricula in PEP and their paths to jobs or further education. The three types of recommended IT curricula in PEP are:

- IT core
- a bridging IT course for selected industries
- a bridging IT course for related mainstream study.

These are discussed in the following sections.

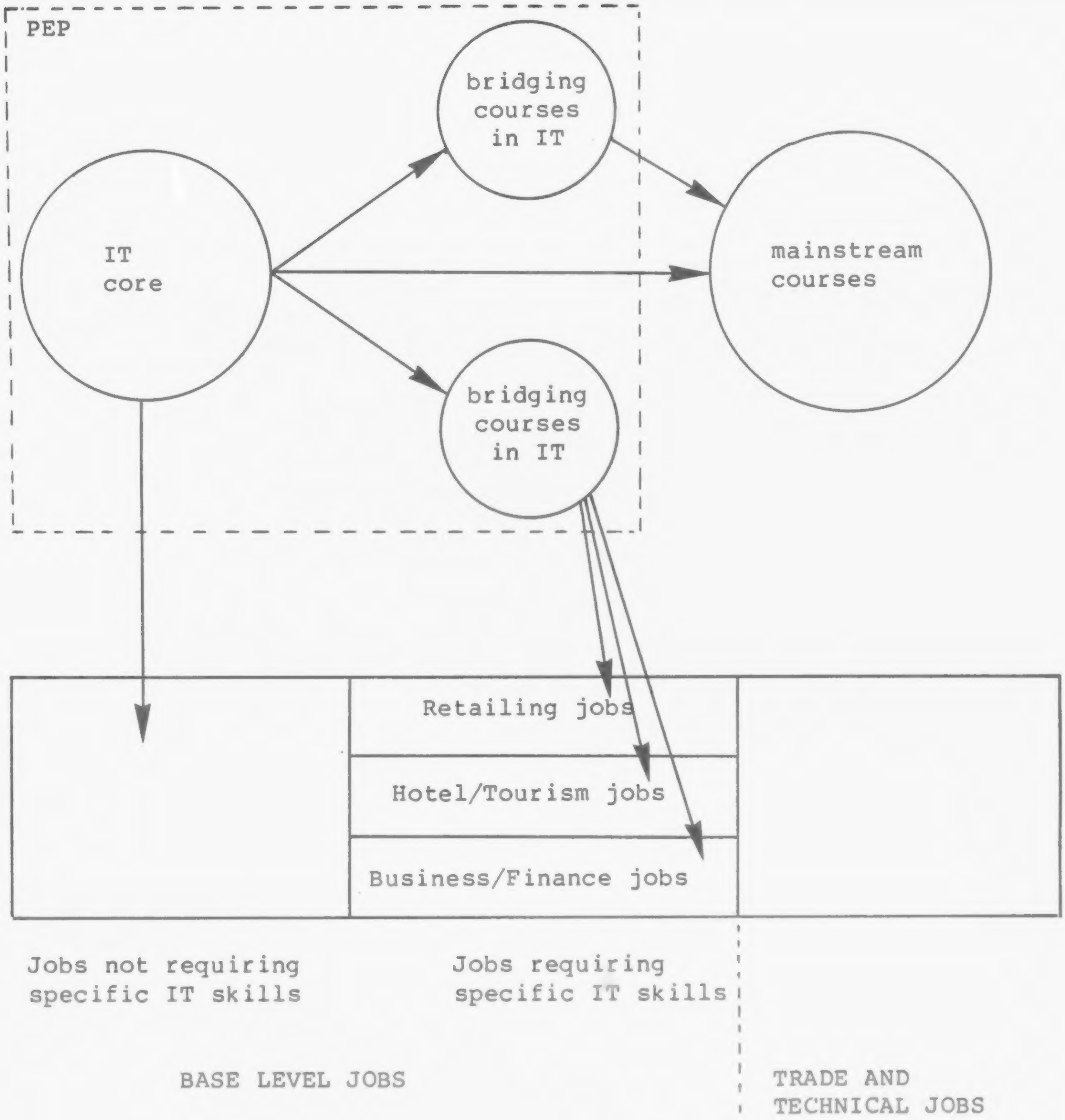

PEP
IT core
bridging courses in IT
mainstream courses
bridging courses in IT
Retailing jobs
Hotel/Tourism jobs
Business/Finance jobs
Jobs not requiring specific IT skills
Jobs requiring specific IT skills
BASE LEVEL JOBS
TRADE AND TECHNICAL JOBS

Figure 10.1: The three types of IT curriculum in PEP and their paths to jobs or further education

10.2 A CORE CURRICULUM

In order to address the issues as outlined in the previous section, and bearing in mind the general aims of PEP, the following general aims for the IT core curriculum were formulated by the project team.

The core curriculum should:

- increase participants' knowledge and understanding of the diverse nature and social penetration of IT;

- enable participants to develop a literacy in the terminology associated with IT in order to increase their understanding of the relationship between IT and political, economic, social and ecological change;

- increase participants' knowledge of some of the specific functions of IT in order to improve and assist their ability to adapt to IT-induced change.

These aims have been translated by the project team into six objectives, which are:

- to know what Information Technology is;
- to know a range of Information Technology vocabulary;
- to be able to operate a micro-computer, including operation of a standard software package;
- to be aware of applications of Information Technology in industry, commerce and the home;
- to be aware of current trends in Information Technology and its social implications;
- to appreciate what a program is and why it works.

What level of familiarity with the various aspects of IT are sufficient for personal development and future employment? What Information Technology awareness is necessary in order to take one's place as a 'non-disadvantaged' adult member of society? What one person may regard as necessary, another may hold to be superfluous. Few people would disagree, for example, that it is necessary to be able to read or write in order not to be a disadvantaged member of society. To what extent one needs to read and write is not so readily agreed upon. The project team has taken the view that as a minimum standard it is necessary for all members of our society to understand the possible personal, social and career implications of IT as may be reported in our daily papers.

The project team believes that specific objectives, encompassed by these general objectives, should be developed by individual program co-ordinators. They should reflect the individual program's aims and objectives (refer Section 8.5). Nevertheless some indication of the appropriate scope of the IT core curriculum for a typical PEP is offered below as a suggestion:

Suggested theory

Basic Information Technology terminology.

Basic Information Technology processes.

Basic computer structure: mainframe, micro.

Computer software.

History of Information Technology development and recent development.

Information Technology awareness, including technologies in the home, scanning, robotics, communication, CAD/CAM, computer networks, electronic funds transfer, biotechnology, teletext/videotex, facsimile transfer, data banks, satellite communications, bulletin boards, computer networks, technology in industry and commerce, social implications, health, ergonomics, personal privacy.

Principles of programming.

Suggested practical

Keyboard skills (will be required over the next few years before 'mouse' or voice input replaces keyboard input).

Terminal operations.

Micro-computer operations.

Use of software packages, including word processing, database, spread sheet, and bookkeeping packages.

Use of modem to: access a mainframe, access Viatel.

Write an elementary program.

Skills and knowledge in this curriculum will (at the very least) provide for personal development and the development of skills which the results of the industry survey (refer Chapter 7) indicate should be relevant for future employment. The introduction to programming should prove useful for future education.

The required skills and knowledge cannot be provided simply by a theoretical approach, given both the subject matter and the clientele. Ideally, the practical and theoretical aspects will be taught in tandem, as the practical aspects can be used first to introduce and then to reinforce much of the theoretical work.

In the practical sessions there is a great deal of active learning, which is readily facilitated by groups of two or three using the same equipment. It is not necessary for each participant to have his or her own set of hardware. There is a growing belief that the optimum number of students at a computer in the type of practical work outlined for the core curriculum is two or three (Davidson and Firkin, 1985). When larger groups are clustered around a computer or terminal, however, some members of the group become passive.

The project team believes that a minimum of 100 hours should be devoted to the presentation of this core curriculum to PEP participants. The theory section (which may be taught in a variety of ways using different learning methods and resources, visits, etc.) corresponds closely to the Group A knowledge and skills identified by Hall et al. (1985, p. 23), who recommend that a minimum of 40 hours be allocated to the learning of Group A knowledge and skills in traineeships for personal development and future employment. As the theory component of the core curriculum is presented to PEP students for the same reason, it is fair to assume that the same amount of time should be devoted to it.

The practical section which consists primarily of specific practical skills in common use now in both educational and working environments is similar to the Group B units identified by Hall et al., where they recommend that a minimum of 90 hours be allocated to their learning. Here however, there is a fundamental difference in performance levels expected of traineeship students and PEP students. The project team believes that approximately 60 hours would be a reasonable length of time to spend on the practical work (slightly longer than the time spent on the theory).

The total time of 100 hours minimum corresponds closely to three hours per week for 36 weeks, which would be similar to the average time generally devoted to computer studies projects now.

Recommendation 6

It is recommended that all vocationally orientated PEPs include a core curriculum in IT as outlined.

10.3 BRIDGING COURSES FOR SELECTED INDUSTRIES

The IT knowledge and skills required for base-level jobs in the retail, hospitality/tourism, and business/finance industries are discussed in Chapter 7.

The pertinent result of the industry survey is that there are two main types of base-level job within each industry requiring IT skills and knowledge. These are:

- word processing/electronic office jobs,
- clerical/accounting jobs.

Although two or more jobs may be encompassed by each of the above two job types, there is merit in providing PEPs as preparation for these job types rather than for individual jobs.

Based on the results of the industry questionnaire and interviews, the following objectives are recommended for a bridging course in IT for word processing/electronic office jobs in all three industries:

> Keyboard skills: to provide participants with keyboard skills to touch type accurately, while applying ergonomic principles.
>
> Word processing skills: to provide participants with skills in operating word processing packages in common use.
>
> Office practice and procedures: to provide participants with a knowledge of modern office practices and to alert participants to the possible impact of technology on these practices.
>
> To train participants on office machines such as photocopiers, calculators, etc. with particular reference to Information Technology specific to each of the three industries.
>
> Computing: to further develop participants' knowledge of the operation of a mainframe computer in a business environment.
>
> To further develop participants' skills in the use of micro-computers and specific relevant software packages and their applications to the working environment.
>
> Discuss and describe the concept of computer networks.
>
> Business environment: Cover the interrelation between work, Information Technology and the individual.

It should be remembered that these objectives assume the prior or concurrent completion of the IT core curriculum.

The project team believes that specific objectives, encompassed by these general objectives, should be developed by individual PEP co-ordinators. The specific objectives should reflect the individual program's aims and objectives and the particular job opportunities in the local area. Practical tasks undertaken by the participants should be based on the types of tasks likely to be performed if they were employed in these identified jobs.

Based on the results of the industry questionnaire and interviews, the following objectives are recommended for bridging courses in IT for clerical/accounting jobs:

- to understand and in many instances operate various methods of information transfer within industry and commerce;
- to understand and have confidence in using data base, spread sheet and bookkeeping packages on microcomputers;
- to understand simple basics of bookkeeping and accounts, payroll systems, and stock control as used in industry and commerce to facilitate the use of relevant software packages to produce reports;
- to understand the effect of IT in the workplace in relation to themselves, their environment and overall organisational structure.

For PEPs aimed at jobs within the retail industry, an additional objective is:

- to understand the nature and applications of:
    - point of sale terminals
    - electronic funds transfer
    - electronic mail, information bulletins.

For PEPs aimed at jobs within the hospitality/tourism industry, an additional objective is:

- to understand the nature and applications of:
    - videotext/teletext
    - computer networks.

For PEPs aimed at jobs within the business/finance industry, and additional objective is:

- to understand the nature and applications of:
    - on-line equipment
    - computer networks
    - electronic mail.

It should be remembered that these objectives assume the prior or concurrent completion of the IT core curriculum.

As for the word processing/electronic office bridging course in IT, the project team believes that specific objectives, encompassed by these general objectives, should be developed by individual PEP co-ordinators. The specific objectives should reflect the individual program's aims and objectives and the particular job opportunities in the local area. Practical tasks undertaken by the participants should be based on the types of tasks likely to be performed in these identified jobs.

In this section and the previous section we have presented an IT core curriculum and two types of IT bridging course. The IT bridging course for PEPs aimed at clerical/accounting jobs should vary according to the particular industry for which the program is designed. Figure 10.2 illustrates the relationships between these courses (as discussed above) and the targeted base level jobs.

How the curriculum itself is presented is very much determined by the equipment and facilities available. It is expected however that site visits to see much of the Information Technology equipment being used would be an integral part of the curriculum. Similarly, it is expected that a modem would be an essential item of equipment. A modem facilitates the accessing of Viatel and other remote databanks as well as establishing simple computer networks. Computer networks were seen by all three industries surveyed as an area of increasing technology (refer Table 7.1). Obviously in a bridging courses such as this, the more time devoted to skills development, the higher the likelihood of mastery; however, the equivalent of a semester full-time would seem reasonable.

Recommendation 7

It is recommended that the bridging courses in IT (as outlined) form the basis of programs preparing for employment in the three industry areas of hospitality and tourism, retail, and business and finance.

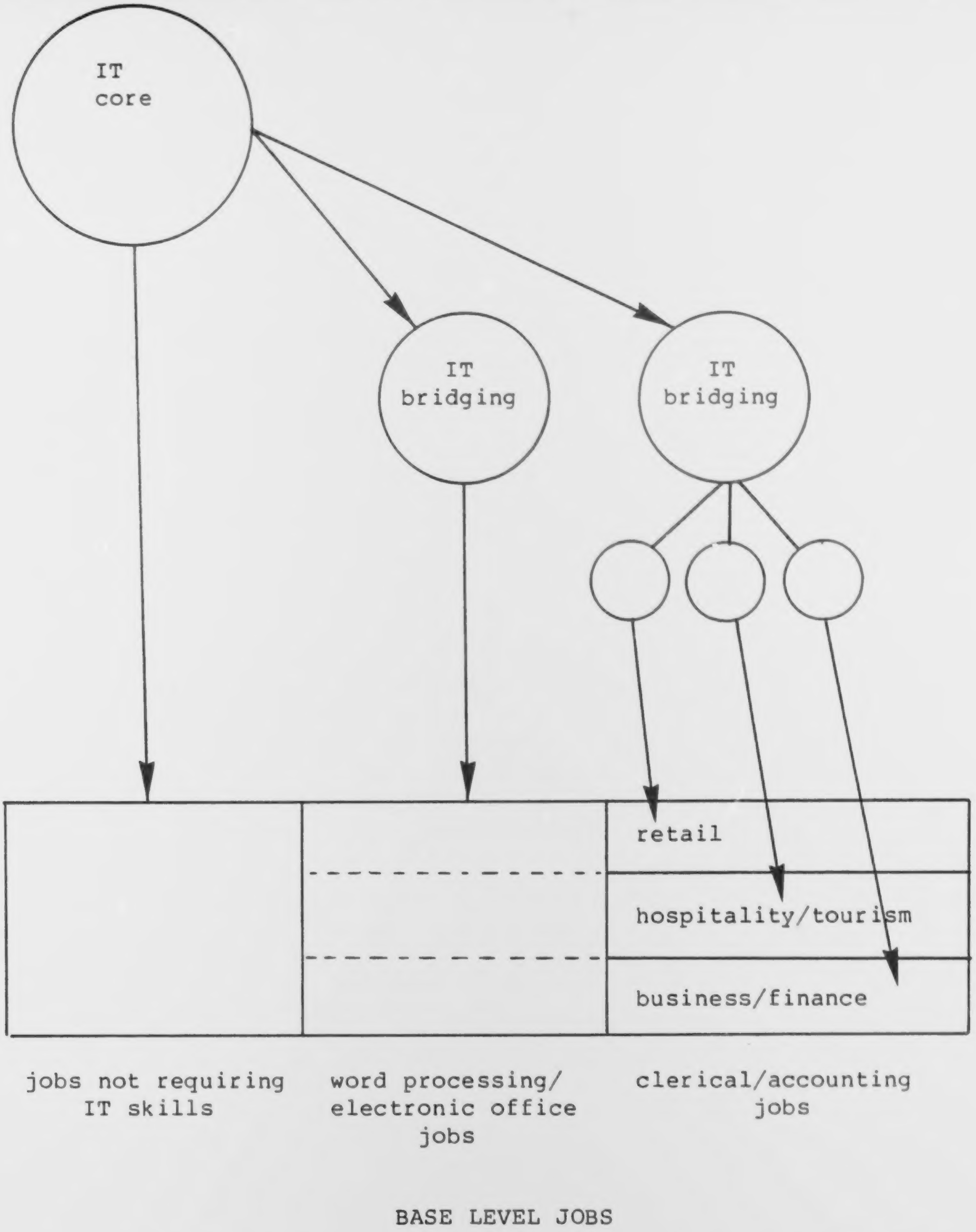

IT core
IT bridging
IT bridging
retail
hospitality/tourism
business/finance
jobs not requiring IT skills
word processing/ electronic office jobs
clerical/accounting jobs
BASE LEVEL JOBS

Figure 10.2: Relationships between IT courses and base level jobs

10.4 BRIDGING COURSE FOR RELATED MAINSTREAM STUDY

In attempting to determine what should be included in an IT bridging course to enable PEP students to progress to related study areas, the project team felt that the basic principles and knowledge that underlie a particular area of study are not usually radically altered by the application of IT. Ultimately, therefore, a PEP participant who wishes to progress to a course of study must have the ability to cope with the associated studies of that course. That is, IT is not a substitute for general skills within a field of knowledge. In addition, the range and number of courses that can be associated with IT is incredibly large and varied. Also, the numbers of PEP students who go on to further study is small. From the experience of the project team this was about 10-15 per cent.

In view of the above, the project team felt that it was not feasible to draw up a curriculum outline. Rather, it felt, that the best course of action was to present a set of statements that could serve as guidelines that could be used in the development of individual learning contracts for students who wished to progress to further study.

A learning contract in the view of the project team gave PEP participants who wished to pursue further studies the greatest possible chance of success. A learning contract, however, is not a student-directed curriculum, it is a realistic, mutually negotiated educational program that leads the student to a well defined end point. In this instance the contract should be negotiated between the participant, member(s) of program staff and a course advisor.

The course advisor would be a staff member of the college department that offers the course of study the PEP student wishes to enrol for. The well defined end point is enrolling in the course of study of the student's choice and perhaps even gaining an exemption from one or other part of it.

The project team offers the following points to be considered in the drawing up of an IT-based learning contract for PEP participants:

- A learning contract should not be finalised until the student has completed the core curriculum in IT (or the equivalent). This is to ensure that the student is familiar with the Information Technologies and their various implications. The student will then be in a realistic position to take part in mutual negotiation.

- Through the operation and use of IT (particularly the computer) it may be possible to hasten learning development which will help the participant cope with the more formal aspects of mainstream study. In particular, the computer could be said to assist in:

  i. Cognitive development

  The computer can generate the possibility of visual as well as aural stimulation of the cognitive processes which can include:

  classification
  estimation
  hypothesis formation
  risk taking
  experimentation
  induction
  logical reasoning
  deduction.

  ii. Inquiry learning

  The possibility for inquiry learning whereby a participant is encouraged to question, investigate and provide an answer is fostered through the use of computers. This pattern of learning can be summarised as:

  - identification and definition of issues
  - formulation of hypotheses
  - data collection
  - data analysis and processing
  - drawing conclusions
  - final evaluation.

  iii. Problem solving

  In many respects computers are an ideal vehicle for promoting problem solving strategies in learners. A typical pattern may be:

  - presentation of problem
  - speculation, hypothesis-formulation
  - typical planning of method of solution
  - devising a solution
  - testing the solution
  - deduction.

- Keyboarding skills, while not in themselves useful as a further learning skill, are useful in that they enable efficient access to the power of the computer. In this context, it must be remembered that access is the prime requirement, not efficient typing. The ability to use all the fingers in terminal entry is, in the view of the project team, more than sufficient.

- To obtain the benefits outlined above it must be borne in mind that these are reaped as a consequence of the way in which the technology is used and not as a consequence of the technology per se. This means that there are some uses of the technologies that need to be carefully considered by both student and mentor before they are adopted. Drill and practice are an obvious example of this.

- It is the expectation of the project team that the main form of work that a further study bridging course would involve is project work. The project would be inter-disciplinary in nature and involve an investigatory or experimental approach. Included could be activities which require judgement about the value of particular data, ideas, uses of materials and design concepts. It is envisaged that the project would be primarily open ended in nature and require the student to investigate, synthesise data and information, make judgements and test these judgements. That is, undertake the sorts of tasks that can be readily serviced by the use of the Information Technologies.

- If a participant does not know what course of study he or she ultimately wishes to undertake, then a project such as undertaking a study of technology in society could be set.

CHAPTER ELEVEN: FURTHER ISSUES

11.1 STAFFING AND STAFF DEVELOPMENT

In order to teach IT curricula effectively PEP staff need to be:

- committed to the philosophy of including the study of IT in their program;
- technically competent in the use of, and aware of the effects of, the IT covered;
- able to establish relevant objectives within the overall goals of the curricula presented that reflect the needs of their particular students.

The above qualities, while easily listed, are not readily found. The recent report Information technology training within traineeships: Options for TAFE based courses (Hall et al., 1985) stated:

> - There is presently a shortage of qualified IT teachers and trainees. The interview results indicate that approximately 5 per cent of TAFE teachers are presently able to teach IT at a fundamental level . . .
> - Where teachers will have to be trained to teach IT, it is expected that six to eight weeks full time would be the minimum requirement . . . (p. 74)

Given the many parallels between the clientele of PEP programs and traineeships, one could expect a similar situation for PEP staff with respect to the number of program staff qualified to teach IT and the minimum training time required to become 'qualified'. Wherever possible, therefore, colleges running PEP programs would need either to employ sessional staff (or mainstream staff) to teach IT, or to obtain a series of guest lecturers to cover specific aspects of IT, unless they happen to have staff already qualified to do so.

However, general aspects of IT should be included in the teaching programs of all staff. This may mean the removal of any personal anxiety on the part of PEP staff (and practically all of us have some anxiety in this respect) towards the new technologies. Curiosity, access and a willingness to experiment by staff will go a long way towards turning them into competent teachers of the new technologies.

It may be necessary (in spite of the responses reported in Chapter 5) to consider the introduction of a seeding program whereby one staff member of each PEP program is given in-service training in IT. This staff member then becomes responsible for passing on to the rest of the staff the knowledge and expertise gained through attending the in-service course.

Such a seeding program is proving successful in ensuring the spread of computer literacy among staff of secondary schools, particularly when those who attend the in-service course have had no prior experience in handling the new technologies.

In promoting the involvement of all teaching staff in the teaching of IT in PEPs, the project team emphasises that there is evidence to suggest that inequities exist in the access and participation of primary and secondary students to computers and in computer classes. One readily finds statements in the literature such as:

> Recent research has revealed, for instance, that low income, racially/ethically different students in the U.S. are less likely to have access to information technologies than their middle or high-income peers. When they do, these technologies tend to be used to teach them in ways that systematically differ from middle and high-income students. If the medium is the message and this remains to be researched, the U.S. may be in the process of creating an information society with differential access to the technology (and the other resources that this implies) that parallels income and racial/ethnic lines. (AERA, 1985)

not only across schools but also within schools. There is mounting evidence to show that within schools males and females have different access and participation rates. Alvarado (1985), sums this up by saying:

> While we have found that boys and girls use computers equally in the early grades 'something' seems to happen at the onset of puberty. At this age female students show less interest in computing . . . As a result many female students leave school with limited career options and traditional female roles are subtly reinforced. (Alvarado, 1985)

The Victorian Education Department's publication Policy on computers in schools (1982) seeks to address this situation:

> As the Education Department is committed to equality of opportunity, policy on the use of computers in schools will ensure that all students have access to computer facilities. The special needs of girls in computer education will be an important concern.

While these issues may in themselves not be unfamiliar to PEP staff, coping with them may be, especially if (as was indicated in the response to the project team's survey) student directed curricula are the norm (Table 4.1). PEP staff must be extremely sensitive to these issues if they are to avoid the perpetuation of inequities that exist elsewhere. Strategies must be developed in order to avoid this.

Recommendation 8

It is recommended that a seeding program be established to train one member of staff in each TAFE College running PEPs in IT, and that this person become responsible for disseminating his/her newly acquired skills among PEP staff. Every effort should be made to ensure that before training this 'seed person' be non-technical and non-literate in the Information Technologies.

11.2 EQUIPMENT

The issues surrounding equipment are in many respects sensitive ones. The project team does not believe it is in a position to make recommendations which may cut across existing college policies, program directions and PEP guidelines. The project team does, however, wish to make the following observations:

- Given the large number of PEP participants who advance educational and employment objectives as reasons for joining the PEP progam (refer Section 7.2) and given the aims of PEP in Victorian TAFE, it makes sense to use 'business' equipment wherever possible (i.e. hardware and associated software commonly used in business, or by likely employers if that is known). This is not a firm statement by the project team, but is offered as a guide. In Chapter 6 it was noted that such a policy was working quite successfully in the British ITeCs.

The project team accepts that the equipment colleges eventually use may be determined by a host of factors, not all of which are under the control of the program co-ordinator. It is important, however, that co-ordinators weigh up the factors for and against the use of certain types or brands of equipment and determine how they interrelate with the students the project is targeted at and the kind of exit students the program hopes to produce (refer Section 7.5).

- It is selfevident that PEPs will not have access to anywhere near the diversity of IT equipment that is available in today's market place. However, the widest possible exposure to such equipment should be aimed for. Exposure in this sense could be excursions to trade fairs and exhibitions, local businesses, collecting brochures, etc., as well as more detailed oportunities to use such equipment whenever possible. The policy of exposing students to a wide range of equipment is proving successful in the British ITeCs.

- A modem is a relatively cheap and simple way of providing participants with access to a variety of mainframes, data bases and information networks. It also serves to introduce participants to the whole concept of telecommunications which is impacting so greatly on our society. The project team believes the modem to be an essential item of equipment in the teaching of IT, yet it is the one item they did not see in evidence.

- Providing a wide range of IT equipment is undeniably expensive. Elsewhere in this report it has been recommended that practical experience in the use of computers be provided, and this requires one computer per student in the class. The per capita cost of equipment is dependent on the rate of use by students. Clearly it is much more conomical for each computer to be used for say 40 hours per week, 40 weeks per year then say 10 hours per week, 20 weeks per year. Arrangements which increase the usage rate should be preferred. One way of achieving this, which is suggested in this report, is to have ITeCs serving 4 or 5 PEP centres.

11.3 SUGGESTED MATERIALS TO BE DEVELOPED

Information Technology is a volatile curriculum area, with new methods and products superceding old ones in rapid succession. In most areas of IT, only recently developed materials are reasonably up-to-date and useful. For this reason, many of the most useful resources available to the IT teacher are to be found in newspaper articles, journals and short monographs.

A list of useful resources in IT, with notes on each item, is found in the publication Annotated Information Technology Resources for PEP Teachers (Sandery & Hall, 1986). The list of resources in this publication mainly includes:

- journal articles
- monographs
- books (published within the last three years).

Some of the materials are published by overseas organisations, such as the Further Education Unit in London, and may be somewhat difficult for teachers to obtain. It would be useful if an Australian agent were to be established for such major overseas organisations producing IT materials.

Of the resources currently available to IT teachers, there appears to be a dearth of recently published books covering a wide area of IT and written at an appropriate level for PEP participants. There are some good and up-to-date books on IT, but these are too technical for the type of curriculum we have recommended in this report.

There is also a need for books on word processing, data base, spread sheet and bookkeeping/accounting software at an appropriate level for PEP participants. The software suppliers' manuals are often unsuitable for educational purposes. Two types of books would be useful:

- a book that gives an overview of business software, the types available and their merits.

- books that introduce a few of the common software packages within one area, such as word processing software.

If statewide or national accreditation and use of curricula in IT occurs, it will be feasible to develop more specific curriculum materials at State or National level. It would be logical to start this process in the area of the IT core curriculum. Two recent initiatives in Britain and Europe are relevant, these being the City and Guilds of London Institute's Information Technology 726 Scheme (refer to Chapter 6) and the European

Training Materials Network. The TAFE National Centre intends to monitor developments in these two schemes as they may be applicable in Australia. IT curriculum materials developed within each scheme may be adapted and used in Australia.

Recommendation 9

It is recommended that some IT materials, at a level appropriate for PEPs, be developed. Further, that if IT curricula for PEP is introduced on a statewide basis in Victoria, it is recommended that specific curriculum materials be developed for such curricula, with priority given to the IT core curriculum.

11.4 SOME OTHER ISSUES

Delivery

The project team has not considered the possibility of using IT as a method of delivery of curriculum content of PEP programs. While acknowledging the potential of IT to provide instruction, the project team is also sensitive to the fact that such methods may be totally unsuited to a large number of PEP participants. To this extent it is not willing to do more than refer those interested in this aspect to the annotated recommended further reading monograph associated with this report.

Visual learning

The advent of IT in the learning environment has greatly enhanced the use of visual learning strategies. There is still a great deal of research to do in the area of visual learning preferences/strategies (Post, 1982). This is particularly true in relation to matters of equity.

An information workforce

Education for an industrialised workforce was characterised by the fostering of discipline and conformity. In contrast, it could be said that education for an information workforce requires a fostering of entrepreneurship and creative imagination.

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APPENDIX A: ADVISORY COMMITTEE MEMBERSHIP

NAME	AFFILIATION
Dr W C Hall	Project Manager
Dr J Lechte	Youth Programs Branch
Mr B Lloyd	Chairperson
Mr M Post	Research Officer
Ms C Sandery	Research and Development Officer

Two proposed positions representing the Industry Training Committee and the Government Training Authority were not filled.

APPENDIX B: COLLEGE QUESTIONNAIRE WITH SAMPLE COVER LETTER AND CURRICULUM MATERIALS CATALOGUE SHEET

TAFE
TAFE NATIONAL CENTRE FOR RESEARCH AND DEVELOPMENT LTD.
296 Payneham Road, Payneham, South Australia 5070, Australia. Phone (08) 42 7905
(Incorporated in South Australia)

Our reference: OP6:CS:st

22 October, 1985

Dear

The TAFE National Centre for Research and Development has been commissioned by the Participation and Equity Program of the Office of the TAFE Board in Victoria to develop information technology curriculum.

For the purpose of this project, information technology is defined as the technology associated with the processing, transfer and storage of information by electronic means.

There are several components to the project including:

- an analysis of what is already being done in Colleges;
- suggestions on how information technology can be included in PEP's in general, in bridging course to associated study areas and industry specific courses;
- a description of available curriculum materials.

Therefore we are seeking your help in two ways:

- completing the attached questionnaire; and
- completing the attached curriculum materials catalogue sheets.

It is to be hoped that you will see the merit of the Project and therefore will not object to filling out the enclosed questionnaire and returning it to us.

The project is being managed by Dr W.C. Hall, Executive Director of the TAFE National Centre. The research officers are:

- Mr Geoff Hayton, TAFE National Centre
- Mr Maarten Post, Royal Melbourne Institute of Technology
- Ms Charlotte Sandery, TAFE National Centre.

Should you wish to have further input into the Project, please feel free to contact Maarten Post at RMIT (Ph: (03) 663 5611 extn.220). He will be only too pleased to assist you in relation to this matter.

Please may I say how grateful we are to you for helping in this way?

The completed questionnaire should be forwarded to me at RMIT by placing it in the enclosed stamped self-addressed envelope. It would be appreciated if the questionnaire could be returned by 15 November 1985.

Yours sincerely,

MAARTEN POST

INFORMATION TECHNOLOGY CURRICULUM IN PARTICIPATION EQUITY PROGRAMS QUESTIONNAIRE

Name of college ______________________________

Address ______________________________

Name of person answering questionnaire ______________________________

Contact phone numbers ______________________________

1. List the participation and equity programs that are provided by your College.

   (a) Total number of programs ______________

   (b) Programs for specific student groups

No. of programs	Specific student group

   (c) Programs designed for a particular vocational, career and/or industry orientation.

No. of programs	Vocation	Career	Industry

2. Describe any common subject material in the programs (e.g. verbal skills).

____

____

____

____

3. List the present provision of Informtion Technology (IT) content in your College's Participation and Equity Programs. If there is no IT content provided, place an 'X' in the box: ☐.

Program	IT Content
For example	
Business studies	Keyboarding Wordprocessing Telex Switchboard

Program	IT Content
______________	______________________
	______________________
	______________________
	______________________

Program	IT Content
______________	______________________
	______________________
	______________________
	______________________

IT Content	Program
______________	______________________
	______________________
	______________________
	______________________

IT Content	Program
______________	______________________
	______________________
	______________________
	______________________

(Please add additional pages as required.)

4. Indicate by ticking the appropriate boxes, the information technology equipment used for educational purposes that is available in your college and the access in average number of hours per week that the equipment can be used by the Participation and Equity Programs students.

Information Technology equipment in your college	Available	Hours per week accessable to your Participation and Equity Programs			
		0	1-10 hrs	11-20 hrs	21+ hrs
mainframe (either owned or space hired from elsewhere)	☐	☐	☐	☐	☐
mini computer(s)	☐	☐	☐	☐	☐
micro computer(s)	☐	☐	☐	☐	☐
computer network(s)	☐	☐	☐	☐	☐
information bulletins	☐	☐	☐	☐	☐
telex	☐	☐	☐	☐	☐
electronic mail	☐	☐	☐	☐	☐
word processors (dedicated)	☐	☐	☐	☐	☐
access to Plato	☐	☐	☐	☐	☐
access to data bases (e.g. ERIC, CSIRONET)	☐	☐	☐	☐	☐

5. List any information technology equipment that you could claim that your Program 'owns', i.e. is used exclusively by PEP staff and students.

Equipment	No. of pieces of equipment
____________________	__________
____________________	__________
____________________	__________
____________________	__________

6. Indicate by ticking the appropriate box(es) what has been/would be the main factors in determining what information technology content you are/would be including in your Program. Number '1' as the most important factor to '6' as the least important factor.

Has been	Would be	
________	________	facilities
________	________	staff
________	________	equipment
________	________	student demand
________	________	______________
________	________	______________

7. Describe the aspect(s) of the information technology curriculum that you believe are/would be most worthwhile from your students' point of view.

____

____

____

____

____

8. Do you teach the social implications of information technolgoy in your PEP course(s)? Yes ☐ No ☐

If 'yes', please send us appropriate syllabuses, notes, handouts, references, etc.

9. Describe what you would like to have included in any curriculum framework that will be produced by this project (including context, teaching approaches, learning environment). Please give your reasons when answering.

Thank you for answering this questionnaire. Please return it in the enclosed envelope.

DEFINITIONS OF TERMS TO BE USED FOR COMPLETION OF THE INFORMATION TECHNOLOGY CURRICULUM MATERIALS CATALOGUE SHEET

Description of materials

Format - Identify what the materials are (e.g. slides, software package, overhead transparencies, films, video etc.).

Specification - List the number of items, size, length, sound, colour, date etc. of the materials.

Contents - Provide information about the materials in a manner that will enable the prospective use to determine its relevance for their requirements.

Suggestions for use

Audience - Identify the audience for whom the materials were designed and any other possible users for whom you believe it would be suitable.

Objectives - Identify the learning objectives that the materials are designed to help achieve.

Equipment required - Specify any equipment that the prospective user would need to have available in order to use the materials.

User appraisal - Describe the learning context in which you have used the materials and your view of the effectivness of the materials in that context.

Location and availability

Provide an address where the prospective user can acquire further information or a copy of the materials and any costs involved.

Note: Please photocopy the form provided if you require more. Return the forms with your completed questionnaire. Thank you for your assistance.

INFORMATION TECHNOLOGY CURRICULUM
MATERIALS CATALOGUE SHEET

Description of materials

Format ______________________________

Specifications ______________________________

____

Contents ______________________________

____

____

____

____

Suggestions for use

Audience ______________________________

Objectives ______________________________

____

____

Equipment required ______________________________

____

User appraisal ______________________________

____

____

Location and availability ______________________________

____

____

APPENDIX C: INDUSTRY QUESTIONNAIRE WITH SAMPLE COVER LETTER

TAFE NATIONAL CENTRE FOR RESEARCH AND DEVELOPMENT LTD.
296 Payneham Road, Payneham, South Australia 5070, Australia. Phone (08) 42 7905
(Incorporated in South Australia)

Dear

The TAFE National Centre for Research and Development has been commissioned by the Participation and Equity Program of the Office of the TAFE Board in Victoria to develop information technology curricula for three levels of study. One of those levels includes information technology curricula for the hospitality/tourism, retailing and business/finance industries.

For the purpose of this project, information technology is defined as the technology associated with the processing, transfer and storage of information by electronic means.

Because one of the main aims of this project is to identify for selected industries the knowledge and skill required in information technology, we are seeking your help in two ways.

They involve:

1. completing the attached questionnaire; and
2. participating in an interview to be conducted with you by one of the research officers.

The project is being managed by Dr. W. C. Hall, Executive Director of the TAFE National Centre. The research officers are:

Mr. Geoff Hayton, TAFE National Centre

Mr. Maarten Post, Royal Melbourne Institute of Technology

Ms. Charlotte Sandery, TAFE National Centre.

Mr. Post has contacted you regarding your interest in participating in this project. Please may I say how grateful I am to you for offering to help us in this way? The interview has been arranged for ______________________ on _______________. The reseach officer conducting the interview will be _________________________.

It would be helpful if you would please have your questionnaire completed so it can be used during the interview. Thank you so much for your help.

Yours sincerely,

W. C. Hall
EXECUTIVE DIRECTOR

QUESTIONNAIRE

I. Please indicate the extent of use of each area of information technology in your industry, by circling one number for each area listed.

Key

0 = not used

1 = little used

2 = moderately used

3 = greatly used

Also please comment on likely future use in your industry (if known) in the space provided (e.g. comments like "very important in the industry within the next 5 years" would be helpful).

AREA	**EXTENT OF USE** (Circle one Number)				**COMMENTS ON LIKELY USE**
mainframe computers	0	1	2	3	....
mini computers	0	1	2	3	....
personal/microcomputers	0	1	2	3	....
keyboard input	0	1	2	3	....
optical scanning print input to computer	0	1	2	3	....
voice recognition and synthesis by computer	0	1	2	3	....
computer networks (i.e. computers linked together)	0	1	2	3	....
information bulletins via T.V. (e.g. teletext/ view data)	0	1	2	3	....
telex	0	1	2	3	....

AREA	**EXTENT OF USE** (Circle one Number)	**COMMENTS ON LIKELY USE**
electronic mail	0 1 2 3	....
telephone switchboard	0 1 2 3	....
word processing	0 1 2 3	....
databases on computer (e.g. Ausinet, Medline, AFTEL)	0 1 2 3	....
simulation	0 1 2 3	....
programming skills	0 1 2 3	....
system analysis skills	0 1 2 3	....
other areas of information technology in your industry (please specify):		
(1)......................	0 1 2 3	....
(ii)......................	0 1 2 3	....

II. Identify the job titles and main duties of up to three base level jobs within your industry.

JOB TITLE	**MAIN DUTIES**
1.	....
	....
	....
2.	....
	....
	....
3.	....
	....
	....

III. INDUSTRY APPLICATIONS.

This part of the survey is designed to identify the level of information technology knowledge and skills required in specific aplications for each job type you have named.

Key

A = no knowledge required

B = "literacy" required

C = understanding required

D = specific skills required

For each application, circle one letter per box for each job title you have named. Comments about potential changes in level required would be appreciated.

	APPLICATION	JOB TITLE 1	JOB TITLE 2	JOB TITLE 3	COMMENTS
1.	Word processing (e.g. report writing, documents, letters)	A B C D	A B C D	A B C D	....
2.	Spreadsheets (e.g. work scheduling, estimating, planning)	A B C D	A B C D	A B C D	....
3.	Database packages (e.g. Inventories, accounts, catalogues, records)	A B C D	A B C D	A B C D	....
4.	Bookeeping/ accounting packages	A B C D	A B C D	A B C D	....

	APPLICATION	**JOB TITLE 1**	**JOB TITLE 2**	**JOB TITLE 3**	**COMMENTS**
5.	Other applications (please specify)				
(i)	....	A B C D	A B C D	A B C D	....
(ii)	....	A B C D	A B C D	A B C D	....
(iii)	....	A B C D	A B C D	A B C D	....

IV. ON-THE-JOB TRAINING

Please describe recent and planned training:

1. provided by your organisation related to information technology knowledge and skill development for your staff;
2. provided by other organisations but attended by your staff.

....
....
....
....
....
....
....
....
....
....
....
....

Thank you for completing the questionnaire. It will be picked up at the time of the scheduled interview.

APPENDIX D: EXAMPLES OF NEWSPAPER EXTRACTS

The following newspaper articles are reproduced from the Computer Supplement of The Australian.

Permission to reproduce these is gratefully acknowledged.

5/11/85	Walker, Greg. Keeping account of Vic schools.
12/11/85	Johnston, Bill. Students reap benefits from digital farming.
12/11/85	Jacob, Angelic. Monitor 'pinpoints' stress behind RSI.
3/12/85	Parlour, Richard. Why the days of the computer are numbered.
14/1/86	Monney, Brian. The sky is the limit for portable satellite terminal (AAP Information Services Pty Ltd).
14/1/86	McIlwraith, Andrew. WA system puts the byte on drug addicts.
21/1/86	Program gives direct help to poor readers.
28/1/86	Coy, Peter. US groups seek backup security. (AAP Information Services Pty Ltd).
28/1/86	Jacob, Angelica. Learning the hard way from natural disasters.
28/1/86	Kassler, Michael. Move over K-9, here comes Meldog.
19/2/86	Johnston, Bill. Medical success tied to compo claims, PC finds.

Keeping account of Vic schools

By GREG WALKER

THE Victorian Department of Education is in the final stages of preparing a computer system for school administration.

The system, to be tested at several schools later this month, will primarily monitor accounting activities, but Mr Ian Mitchell of the department's informations systems section says it is expected to have other uses as well.

"We will see how everything works out with the accounting aspect and from there hope to begin filing details such as student records," he said.

Mr Mitchell says the hardware being used for the operation is not a significant aspect and that most of the research has gone into developing a unique software application for schools.

"We can use any microcomputer with a minimum of 10Mb. Our main concern has been to develop the software so we can eliminate accounting costs within schools."

The software development has been carried out entirely within the informations system department, which says it intends that all schools with more than 200 students should eventually use the system.

"The need for account-keeping in schools is increasing and we hope to have the majority of primary and secondary schools using the system some time next year," Mr Mitchell said.

Upgrade will allow managemnt of the piggery. From left: Dookie piggery manager Andrew Payne-Croston, lecturer John Heaps, and Webster's Peter Collins

Students reap benefits from digital farming

By BILL JOHNSTON

ONE of Victoria's oldest agricultural colleges and one of the first to implement computer farming teaching has upgraded its system to cater for the increasing students use.

Dookie Agricultural College first went on-line in 1978 when it purchased an Australian-designed Webster Spectrum minicomputer.

Since then, the college has trained more than 500 students in the many aspects of computer farming. The system was upgraded in 1982, adding 30Mb of Winchester disk with 256K of internal memory.

The latest upgrade includes a more powerful DEC LSI-11-73 processor, and increased internal memory memory to 512K.

The system is currently being used to teach students how to program and run software applications such as database and spreadsheet. In addition, it is being commercially used by Dookie to manage the college's piggery, which maintains 190 sows.

Administration functions, student information and library records are also being handled by the computer.

Under the current curriculum, more than 250 students will use the system this year through a variety of courses that give each student between four and five hours computer access a week.

The Spectrum computer system will also be used extensively in demonstrations to some 200 delegates from throughout Australia and New Zealand who will visit the college's new computer centre next year and attend the second National Conference on Computers in Agriculture, scheduled for February 11.

The conference is the first of a number of special events staged in the celebrations for Dookie's centennial year. The college is one of the oldest agricultural training establishments in Australia.

Monitor 'pinpoints' stress behind RSI

By ANGELICA JACOB

A REVOLUTIONARY device for treating the "invisible" complaint, repititive strain injury, has led to a marked decrease in RSI insurance claims, according to the manufacturer, John Bands Pty Ltd

The device, called Teno Tech EMG (electro-myography) Muscle Analyser, had led to a large proportion of affected workers returning to their jobs

The man behind Teno Tech, Dr Alan McLeay, said the device was born out of the frustration felt by many doctors treating RSI

Dr McLeay became the John Bands occupational doctor three years His research has involved surveying workplaces to find out where the common strain complaints were arising, assessing work procedures, and comparing the methods of rehabilitation

A paper on his his studies, called Tenosynovitis Revisited, says some people will be affected by RSI in as little as six weeks after starting an activity, while others will be unaffected after 20 years of operating the same equipment It says the complaint is caused by a number of factors, mainly stress and posture, circulation and smoothness of movement

Dr McLeay said one of the problems he encountered during his research was that there was no way of accurately assessing everyone who came to see him with an RSI-type of complaint The Teno Tech monitor was developed to make such assessments

Dr McLeay with Teno Tech

The device measures the amount of electrical energy used in an activity and shows how much muscle tension is present It works using skin electrodes that are placed on the affected area to monitor the level of tension

The device gives out a reading showing the movement that caused the greatest amount of stress and how much pain was caused

Dr McLeay said it meant the cause of the complaint could be easily pinpointed Without Teno Tech, identification was a problem because as the complaint advanced the area of pain widened By using electrodes, the movement with the most muscle tension could be singled out The source could then be removed and the rehabilitation begun

"Applying ergonomics to a work environment alone isn't the only way to cure RSI," he said "Stress plays a big role in causing RSI and that can only be reduced through counselling

"Any form of stress, whether in an employee's personal life or at work, causes unnatural muscle tension This means in an awkward repititive activity the muscles do not relax enough between movements and so cause pain"

One of the big advantages of Teno Tech was its ability to individually assess each RSI sufferer, allowing for personalised treatment, he said As a pain monitor, it would also show if a worker was exaggerating about an RSI claim

Dr McLeay said the psychological problems associated with RSI should be recognised as an important key to rehabilitation

Sufferers worried about the future of their jobs, while many experienced a lack of self esteem as the complaint prevented them from carrying out normal activities

While previous treatments for RSI called for complete rest, Dr McLeay did not believe that was always the best cure For people who felt their job was threatened, he recommended a lighter load of work or, preferably, work in another area

Reducing the stress factor helped to reduce muscle tension and was an important component in rehabilitation

The Teno Tech monitor could also be used to teach both RSI sufferers returning to the workplace and potential sufferers how to avoid the complaint

The counter-revolution is coming

Why the days of the computer are numbered

A COMPUTER-based economy contains the seeds of its own destruction.

That was the revelation that flashed upon me the other morning while I was depositing a cheque at my local building society.

A transaction so banal is not, perhaps, the most likely occasion for an insight of such apocalyptic gravity. Indeed, when I walked into the society's office everything seemed normal to a fault.

Miss A, as always, was mooning over the TV Times; Mr B, as always, was plaintively asking whether it was time for coffee yet; Miss C, as always, was gazing into space with that terrifying vacancy usually seen only in the eyes of chronic users of personal stereos.

Even the sleepwalking languor with which Miss C eventually greeted me and slid my passbook into the printer was, for her, immaculately typical.

The ordinariness of all this only emphasised the extraordinariness of what happened next. Before my cashier had even had time to take my cheque from me, the printer gave an abrupt metallic retch and coughed out my passbook. Miss C, eyebrows raised, wonderingly pushed it back in the printer, which, with a gurgle of indignation, spat it decisively back out.

Animation began to glimmer in Miss C's face like the flickering of a fluorescent light tube that has just been switched on. She tapped at the keyboard, peered into the VDU and then beamed up at me with a smile of enormous, shining delight: "It appears," she said, "that you no longer exist!"

What struck me about this discovery was not so much its significance for myself – instant bankruptcy, relegation to Orwellian un-personality, confirmation of my belief in life after death – as the effect that it had upon the mood of the other two staff. It was electrifying.

The TV Times was forgotten, the coffee postponed. Somnambulism became just an awkward word in the dictionary. The various technological, financial and metaphysical aspects of my annihilation were debated with an excitement which soon became so intense as to demand physical expression as well as verbal.

The printer was gleefully torn apart into a room-wide, electro-mechanical chaos. Where before all had been melancholy, now all was joy. And that set me thinking.

I knew, of course, that the introduction of computers into the workplace was supposed to have mitigated mechanical drudgery. But in practice hadn't it more often intensified that drudgery? It certainly had – in some respects.

In science, the modern researcher's struggles were less with the problems of the universe than with those of the university's operating system.

In manufacturing, computerisation had degraded master craftsmen into nannies to Japanese robots. And what about my building society's poor Miss C? Formerly, she had filled my passbook with an exquisite, slow-penned calligraphy that had made it a private work of art. Now, like the misbehaving printer, she was just another computer peripheral.

It seemed to me that wherever computers had been imported into the world of work they had made it ever more stiflingly impersonal. In fact, computers had proved so radically hostile to the spirit that it was really as natural as springtime that their occasional failures should make spirits leap. And wouldn't it be quite as natural if some people – however wrongly – were to try deliberately to bring such failures about?

The question was, and is, anything but fanciful. Luddism motivated by boredom and frustration is already a fact of industrial life. Analysts of the motor industry found long ago that engineers on production lines sometimes wilfully neglect routine maintenance in order to have the pleasure of coping with the challenge of a full-scale breakdown.

From such passive vandalism to more active kinds is a very short step indeed, and hackers have long since shown that even the best protected mainframes are anything but disruption proof.

The prognosis is plain enough. As computer systems become ever more huge and more intimately interlinked, they will become ever more vulnerable too. And, as more and more people come to see computers as usurpers of their humanity, the wish to sabotage them will become ever more urgent and widespread.

Ultimately, I think, sabotage of computers will become so common and so damaging as to make mass computerisation no longer practicable. People will not be prepared simply to sit back and let an electronic box of tricks do all the interesting work for them.

The same desire for creative self-expression that brought computers into being will ironically – but no less necessarily – reject them. And the computer revolution, like so many other revolutions, will turn out to have borne its own counter-revolution within it.

• *First published in New Scientist, London, the weekly review of science and technology.*

Program gives direct help to poor readers

JOHN is eight years old, and bright. But John's self-esteem is falling because he has a problem. He cannot read.

As with many thousands of children in Australia today, John finds that whenever he looks at a printed page the words are scrambled. An inability to read hinders John's ability to learn other subjects and it is often not long before he is regarded as stupid by other children and, sometimes, by teachers.

The psychological impact of this perceived backwardness is devastating. Confidence slips away. He loses interest in school and begins to skip lessons because each one confirms his perceived ineptitude.

In its most acute form the reading difficulty is known as dyslexia, but there are many shades to the disability between the good reader and the dyslexic.

Now, to help the estimated ten per cent of the population like John who have problems decoding letters and words, IBM Australia is promoting a computer-based remedial reading system call Direct-Helper.

Able to run on the IBM PC, PC-XT, PC-AT and IBM JX, it can be used by children and adults who have no knowledge or experience with computers.

The system was developed by Dataflow Computer Services Pty Ltd, a Sydney-based software house. Originally run on the Tandy, Direct Helper is now compatible with the Commodore 64 disk and the Apple II, IIc and IIe computer systems.

Direct is short for Dyslexic Imaginative Reading Encouragement Using Computer Techniques. Helper refers to the parent, teacher or friend who provides the necessary assistance, support and encouragement as the student progresses.

Direct Helper was conceived and originally written in Australia by Dr John Pollard, a computer scientist with the Australian Atomic Energy Commission, whose son Peter was dyslexic.

Growing increasingly impatient and disillusioned with traditional methods used to teach Peter to read, Dr Pollard decided to create his own. Working at weekends and at nights over a period of two years, he created and refined Direct Helper until it became an accepted and proven method of aiding those with learning difficulties.

He was assisted by Dr Glen Campbell, an education psychologist. Direct Helper contains five programs.

The first, called Say, displays a word letter by letter on the computer screen as the word appears. A rocket ship travels with the letters from left to right, emphasising the direction of reading and writing.

Encouraging

At the same time a tape recording connected to the system enunciates the word, using a voice familiar to the student. As encouragement, Direct Helper congratulates the student at the end of each session and displays a score.

The Story program teaches the student to read sentences and stories. An elephant, dog, fish or butterfly reads the story from left to right, encouraging the student to keep pace.

Using the third program, called Spell, the pupil learns spelling three different ways. First, the recorded voice says and spells the word and the pupil types it using the keyboard. Next, the recorded voice says the word and the student attempts to spell it. Finally, the same words are incorporated in a story.

The student reads the text until coming to a break in the text when the voice says the word. The pupil types it before continuing until he or she reaches the next pause.

Hide and Spell builds on the previous segment. The program spells four words and asks the student to correct the one that is misspelled. The fifth segment, called Prep, is a simple word-processing system.

At the Catherine Mcauley Girl's High School in the Sydney suburb of Westmead, the acting English co-ordinator, Mrs Moya Brown, has been teaching students with Direct Helper since November. The system is installed on an IBM PC.

"We have noticed marked improvements already in children who are aged 13 or 14 but who have a reading age from eight to a little over nine years," she said.

"Their self esteem has improved and they are more confident because they now volunteer to read in class.

"Before, they would never dream of putting their hands up in front of others.

"Also, students attending remedial reading classes tended to have a poor attendance record. They seemed to be ill more often than most children.

"Since they have been using Direct helper they want to come to school. And because they love using the computer Direct Helper doesn't appear to be a lesson to them," she said.

Mrs Brown said next year the school intended to increase the use of direct helper.

A series of books is available to assist users of Direct Helper.

The Trend series contains stories aimed at students of specific reading levels. These stories can be read into the cassette tape and used during teaching sessions.

The director of IBM Australia's software development support centre, Dr Frank Barr-David, said staff from IBM and Dataflow had worked together for a year enhancing the original package.

"We consider Direct Helper, to be an outstanding Australian software package and to our knowledge it is unique in the world," he said.

The sky is the limit for portable satellite terminal

Think of the remotest part of the world — the top of Everest, the middle of the Sahara — and imagine sending and receiving instant messages there with no telephone, no radio and no telex. It can now be done. Last week's Computer Section ran a photograph of the machine which makes it possible. The response was exceptional. This week BRIAN MOONEY, reporting from London, has the complete story.

AN international group based in London has developed a portable satellite terminal which it says can transmit and receive written text just about anywhere in the world.

"This will work anywhere provided there is an unimpeded view to a satellite, either in the open or by a window," the terminal's designer, Mr Hans Christian Haugli, said.

Mr Haugli developed the system, which fits into a briefcase, with a team of fellow engineers at the London headquarters of the International Maritime Satellite Organisation (Inmarsat).

For journalists working off base, faced with the constant problem of having to find a telephone or telex to get their stories out, the system has awesome potential.

They could report directly and instantaneously from remote war fronts, earthquake stricken cities or airline crash sites without even thinking about a telephone.

Businessman, likewise, could have access to their desktop computers or market reports wherever they are, on an Indian Ocean beach or a yacht cruising on the Mediterranean.

Haugli's system, known simply as Standard C, consists of a box the size of a large detergent pack with an omni-directional antenna bulging out of a plastic bubble at one end. It connects to a small battery pack and a minicomputer keyboard.

Including batteries, the set weighs 11.5kg.

"We are not aware of anyone else who has built something so small for civil use," Mr Haugli, a 30-year-old Norwegian, said.

The next size up in satellite terminals packs into two large suitcases.

"Most people think of satellite terminals as large, heavy and bulky. Inmarsat set out to show that it is possible to make something small and easily portable," Mr Haugli said.

Inmarsat was set up in 1979 as an intergovernmental agency to create a global satellite communications system for shipping.

It now has 44 member nations, which include the United States, the Soviet Union, Britain and Japan, and is developing a second generation of satellite capable of handling aviation as well as maritime communications.

Inmarsat operates satellites for private companies and national telecommunications authorities.

It runs on a non-profit basis and is funded by members in proportion to their use of the satellites which cover almost the entire globe apart from the North and South Poles.

Inmarsat's Swedish director general, Mr Olof Lundberg, said the group would spend $US1 billion ($1.44 billion) on up to nine new satellites planned to go into orbit in the next decade.

One of the many spin-offs from development of an aeronautical network will be a system that will enable airline passengers to make telephone calls or key into their personal computers while flying anywhere in the world except over the polar icecaps.

This is the sort of service available though Inmarsat's maritime communications network which provides voice, data and facsimile links to 4000 ships and oil rigs worldwide.

Mr Lundberg said he ultimately envisaged every large ship in the world connecting into the system.

He foresees similar growth potential in aeronautical satellite communications, a sector which Inmarsat was only cleared to enter at its annual conference this past October.

Satellite networks would provide airliners with improved communications for weather, routeing and traffic reports in areas where conventional radio reception is poor.

Instructions and information from ground computers could be relayed to aircraft in flight, Mr Lundberg said.

Computers on board airliners could also be linked via satellites to earth stations, making flight recorders practically redundant by providing a ground monitor of all information stored in them, Mr Lundberg said.

Inmarsat says satellite communications are expanding in part because systems are beginning to cost less. Terminals on ships which started out a few years ago at $US70,000 are now down to as little as $US20,000.

The Standard C portable terminal would cost about $US5000 in its present form which Mr Haugli said could be improved.

"We were not trying to develop a commercial product. We just wanted to demonstrate the concept," Mr Haugli said.

For example, the battery pack, which weighs 5kg, could be made smaller and more powerful, he said.

The dry cell batteries provide sufficient power for two hours of transmission or eight hours of reception.

Reuters

WA system puts the byte on drug addicts

By ANDREW McILWRAITH

WESTERN Australia's Department of Health has enlisted a computer to outwit clever drug addicts who are obtaining multiple prescriptions for drugs to support their habits.

Western Australia has become the latest State to establish a Monitoring of Drug and Dependance System (MODDS) since a recommendation by the Royal Commission into Drug Abuse.

The new $136,000 system records and cross-references all prescriptions of addictive drugs, when they were prescribed, to whom and by which doctor.

The State now joins Tasmania, Queensland and South Australia in having MODDS, but there are no plans to link these systems to form a national network, at least in the short term.

According to the director of pharmaceutical services with the Health Department, Mr Brian Wall, there were practical and political reasons for this.

"Although there would be some sense in linking the eastern States together, Western Australia is fairly isolated and the traffic between the east and west is not much of a problem," Mr Wall said.

"Also, once you start linking systems confidentiality becomes a problem. It was for security that we chose a stand-alone system.

"If we were to link, for example, with Queensland, which runs a mainframe, we would have to be assured of security in its system."

MODDS allows the health department to quickly identify addicts who are using false names to obtain multiple prescriptions and those who are "shopping around" – getting prescriptions for drugs from several doctors.

In launching the system, the State's Minister for Health, Mr Hodge, said: "The prime objective of the project is to try to prevent people getting into a pattern of drug abuse through a variety of ways, including forging prescription forms, making false declarations to doctors and tricking doctors into unknowingly keeping addicts on drugs of dependence."

US groups seek backup security

From PETER COY of the Associated Press in New York

DISASTERS that wipe out computer memories can wreak havoc on a company's business, so specialised companies are starting up to store company records and provide backup computers in case of emergency.

One company is building a storage vault, a 1ha chamber dug from bedrock, 30m beneath the streets of Manhattan's financial district.

Called Dataport, the man-made cavern is under the World Trade Centre, the tallest buildings in New York City. It has a guard station with machinegun-proof glass, halon gas for extinguishing fires and 14 closed-circuit television cameras for surveillance.

Dataport would be a safe place for valuable gems or gold bullion. Instead, it will contain nothing but thousands of reels of magnetic tape – in effect, duplicates of the memories of modern corporations.

Dataport and other storehouses across the country cater to their clients' growing nervousness about their dependence on computers vulnerable to fire, flood, sabotage, theft or simple human error.

Experts say a total computer wipeout with no backup plan in place (an unlikely event) might permanently cripple a business like a bank or brokerage company.

"A computer failure is probably the single most tragic business event that could happen to a company. You can't move product, you can't collect money, you can't ship, you can't collect premiums. You just can't function," the vice-president of marketing for Sungard Services Co. Mr John Ratliff, said.

In spite of the danger, no more than 1000 of the roughly 14,000 data centres in the United States and Canada that use IBM mainframes of the 4300 series or bigger, have disaster plans that include off-site backup computers,the president of Comdisco Data Recovery Services Inc, Mr Ray Hipp, said.

Executives are reluctant to divert large sums of money from pressing needs to guard against a disaster that may never happen, say Comdisco and Sungard, which are No 1 and No 2, respectively, in the business of supplying backup computers.

Auditors are stepping up the security trend, however, by demanding workable disaster plans before they give companies clean bills of financial health. The Internal Revenue Service (IRS) has furthered the trend, imposing several rules governing secure storage of long-term records.

Unfortunately, a disaster that destroys data often destroys machines as well. Comdisco, Sungard and other companies charge clients a large fee for the right to use spare computers that they keep ready and waiting at "hot sites".

For those who cannot afford a hot site there is the "cold site", a room equipped with electricity and phone lines, ready to have a computer installed in an emergency.

Comdisco charges its biggest clients up to $US20,000 ($28,700) a month for access to a big IBM mainframe and a variety of peripheral equipment, Mr Hipp said.

Computer makers suich as IBM and Digital Equipment Corp also offer rescue services, such as rush shipment of replacement computers and consulting by their in-house disaster experts.

The New York Stock Exchange (NYSE) relies on 13 computers to support minute-to-minute floor trading. Three could fail in a way that would bring trading to a halt, the exchange's senior vice-president of market operations, Mr Don Dueweke, said.

Sometimes a small failure serves to remind companies of how serious a big failure would be. At the NYSE, for example, a problem occasionally will cause trading to halt for 15 minutes to 30 minutes.

All the exchange's computers now are in one secure section of a building just off Wall St, but Mr Dueweke said the exchange planned to split the machines between two sites to lessen the chance of an incapacitating disaster.

Like other big New York computer users, the exchange pays a fee to a centre in neighbouring New Jersey that maintains backup computers it can use on a moment's notice, and it stores backup records in a commercial storehouse in upstate New York.

The first data-storage centres, built in the 1950s and 60s out of fear of a Soviet nuclear attack, tended to be in mountain strongholds far from cities.

The newer centres, like Dataport, tend to be more convenient. Records are shipped in and out as often as several times a day.

Learning the hard way from natural disasters

By ANGELICA JACOB

MOST Australian corporations either have backup systems in place or have various backup schemes under serious consideration in an effort to protect crucial data.

For most large computer-system users, such as banks, insurance companies and libraries, backup support remains the trump card without which they would grind to a halt after a crash.

The National Library in Canberra learned the hard way. In March last year, fire, smoke and water destroyed its computer room, gutting its Facom M380R system.

Although the library had leased disks from Storage Technology and the CPU from a third party, the library had to pay more than $200,000 to clean up the site and make it workable again.

Shaken by the enormous loss of vital data, the library, having entertained the possibility earlier, seriously considered a backup system.

The library's former electronic data processing manager, Mr Kerry Webb, said the only deterrent to backup support had been its cost.

"A risk analysis and cost evaluation is a decision every organisation has to make. The need for such a system remains unquestioned, but it is a major management decision," Mr Webb had said after the fire.

The library insisted on carrying on business as usual.

The key reason the library considered a backup system is that it supports the Australian Bibliographic Network with a central database. The mammoth resources range from 12Gb to 14Gb of online information.

Prior to the fire, discussions were under way in Canberra with other Facom users within the Government. The object was to compile a comprehensive computer configuration at a new site. With the backup support, the library could return to normal operation only one day after a disaster.

Last week, library spokesmen refused to comment on progress made since the fire.

The Sydney Stock Exchange faced a similar situation when a flood ravaged its computer facilities in Bond St and destroyed Honeywell equipment estimated to be worth $3.5 million in October 1984.

Joint Exchange Computers (JEC), which operated the exchange's computer resources, had, at the time, made arrangements to set up an alternative site and were given access to Honeywell's dual 870 at its North Sydney head office.

Fortunately for the exchange, all files had been backed up only minutes before water gushed into the computer room where the DRS 1 dual system was installed.

Instead of replacing the damaged equipment at an estimated cost of $2.9 million, JEC entered in to negotiations with Computer Warehouse to buy the Commonwealth Banking Corp's Honeywell 870 equipment. A deal was struck and the equipment was on line two weeks later.

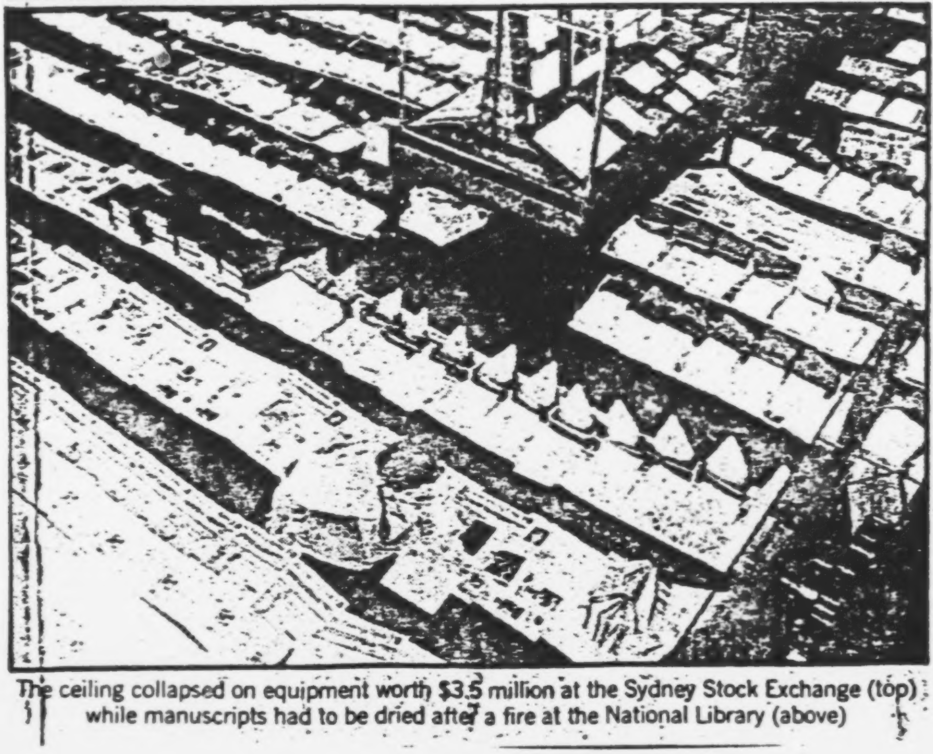
While many companies remain sceptical about the need for backup systems, the nature of their business should dictate whether or not a backup is necessary.

National systems development manager, Mr Bob Samuels, said the exchange has always had backup facilities located in Sydney and Melbourne.

"We have always had uninterrupted power services. But we have gone a little further in that area," he said.

"We are now negotiating with Sydney County Council architects to alter the level of the footpath and, in conjunction with that, erect a low wall in front of the building on Bond St.

"This way, the wall will deflect flood waters, preventing water across the outside footpath to flow into the building. Computer equipment below ground level will thus be protected," Mr Samuels said.



The ceiling collapsed on equipment worth $3.5 million at the Sydney Stock Exchange (top) while manuscripts had to be dried after a fire at the National Library (above)

Move over K-9, here comes Meldog

By MICHAEL KASSLER

ADVANCES in mechatronics promise to significantly enhance the quality of life of the handicapped.

Although robots have often been portrayed as metallic enemies of humanity, in fact the knowledge required to build mobile computer-controlled equipment is directly relevant to the design of prosthetic and other aids which can help the handicapped lead a better lives.

For more than five years, the Mechanical Engineering Laboratory of the Japanese Ministry of International Trade and Industry has carried out research to develop a mechatronic guide dog. The research prototypes have been called Meldog.

Meldog is a wheeled vehicle designed to travel a short distance in front of a blind person. To be useful, it must ensure that neither the person nor Meldog collides with an obstacle or strays outside an acceptable path.

Although the design problem would be simpler if the person rode on the vehicle, an important reason for having a guide dog (mechatronic or canine) is to give its master or mistress exercise.

Meldog has now progressed to the fourth stage of prototype development. Earlier models relied on the presence of artificial landmarks that were specially placed near the vehicle's intended route to enable the vehicle to recalibrate its position.

Meldog Mark IV navigates using natural landmarks whose exact location has been entered into the device's computer together with digitised maps of permissible journeys.

By means of optical and ultrasonic sensors, the vehicle is able to detect stationary obstacles and to move around them. It also is able to recognise some moving obstacles and to adapt its behaviouraccordingly.

Several communication links ensure that contact is maintained between the blind person and Meldog. The person wears or carries electronic controls which allow Meldog's computer continually to monitor the distance from the vehicle to the person.

If the distance becomes too great — for instance, if the blind person stops walking — the vehicle pauses and resumes travel only when it detects that the person has started walking toward it again.

In the United States, a different kind of mechatronic aid for paraplegics and other disabled people has been under development by Professor Larry Leifer and his colleagues, working both at Stanford University and at the Veterans Administration Medical Centre in Palo Alto, California.

Here the concept is to have a disabled person use available sensory modes to interact with a robot and command it to perform functions which the paralysed person cannot readily perform unaided.

For example, someone may find it difficult or impossible to pour a drink or to put food on a plate but may have no difficulty in speaking. Such a person could derive immeasurable benefit from a mechatronic device able to carry out these household actions in response to instructions communicated by using a limited vocabulary of spoken words.

Depending upon the level of artificial intelligence (AI) embodied in such a device, the spoken commands in principle could be high-level (make a toasted cheese sandwich) or low-level (left, right).

A research goal is to determine both how much AI can be given to such a device at the present state of science and what minimum set of capabilities the device must have to enable handicapped people to find it truly useful.

Besides performing various household functions, potential applications of interactively controlled mechatronic aids include physiotherapy, rehabilitation, work-related functions and recreation.

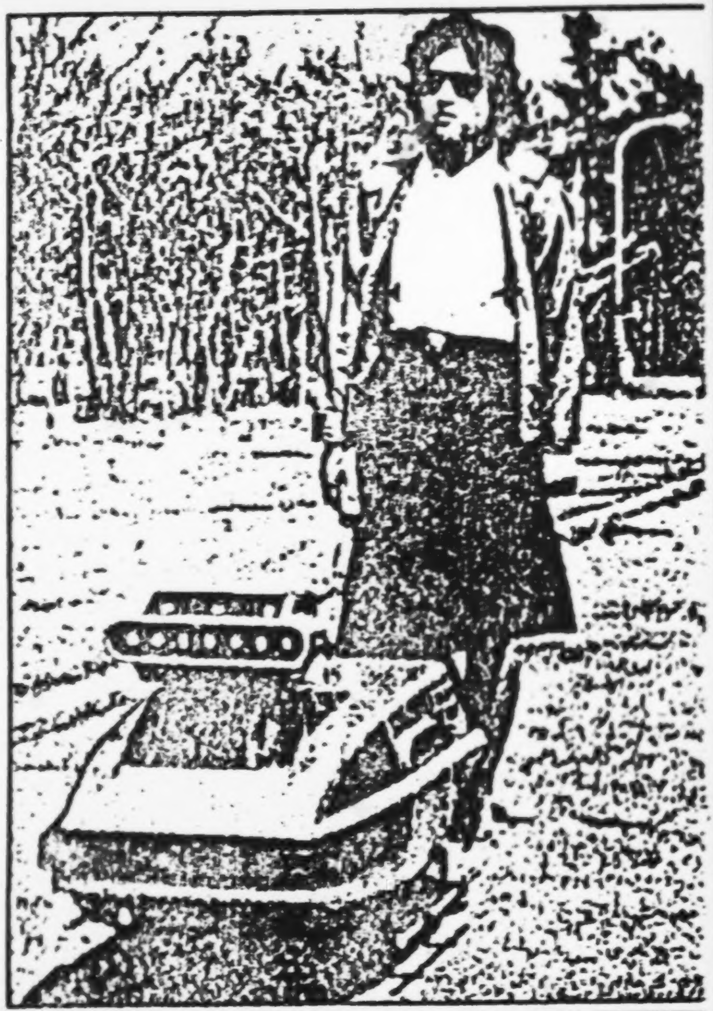
The cost of such devices also must permit those in need of them to acquire them.

Students of Professor Leifer have reportedly demonstrated that an interactively controlled single-arm manipulator can perform some basic cooking functions such as baking a cake. (This is not the same thing as having a robot bake a cake — a task which has never been accomplished. The students used their minds and eyesight to supervise the process rather than a computer program and machine vision system.)

Voice is only one of several modalities that may be used by a paralysed person for interactive control of a manipulator. Other modalities which have been investigated at Stanford and elsewhere include head displacement, jaw displacement, eye displacement, tongue displacement, and patterns of respiratory pressure and vocalisation other than speech.

In each case there must be suitable apparatus to enable the manipulator to obtain clear recognition of at least binary (yes-no) signals by the handicapped person.

Professor Leifer says his work has been designed to test "the hypothesis that robotic technology can be harnessed to serve the manipulation needs of people unable to manipulate their own personal environments directly".



Going for a stroll in the park with Meldog

BEST COPY AVAILABLE

Medical success tied to compo claims, PC finds

By BILL JOHNSTON

ANALYSING the success rate of operations is one of the more unusual applications that Melbourne neurosurgeon, Mr Peter Pretty, has found for his personal computer.

Mr Pretty originally purchased an IBM PC-XT with locally developed Hi-Med medical practice software, to run his company's billing and accounting system.

However, he soon found that the computer system had other uses associated with his practice.

Not only did it improve his practice's accounting procedures – it could also be used effectively as an aid in analysing his surgery.

Using Lotus 1-2-3, he reviewed the results of operations on 100 patients who had undergone cervical discectomies (removal of discs in the neck) over the previous five years.

"I found, as I had suspected, that the surgical degree of success correlated with the litigation status of the injury, many of them workers' compensation," Mr Pretty said.

He said there was already a great deal of interest among his colleagues in the various uses to which he had put his personal computer.

Mr Pretty has been involved with computers for many years, using them initially as an intern at Prince Henry's Hospital in Melbourne and later at the University of California, Los Angeles, where computers were used to analyse the brain's electrical activity.

While he does not use the computer for general word processing, saying the tendency to re-edit letters would be too great, he does use it when writing papers for medical publications.

"I bought the Hi-Med software package and IBM PC-XT from HiSoft because I needed a system that could cope with multiple billings, such as workers' compensation and motor accident cases, where accounts have to be sent to several locations.

"The Hi-Med program has been tailored for individual practices so it can produce all my accounts and calculate appropriate bills.

"With this system, the patient's accounts have only to be entered once, eliminating transcription errors which sometimes occured with manual methods and which then took many hours to locate."

Mr Pretty said another advantage of the package was that he could quickly reconcile outstanding accounts. Previously, he said, this had been a difficult area in which to keep track.

The Hi-Med system had also brought about an 80 per cent reduction in the time taken to produce monthly accounts.

With Hi-Med, patient numbering can be accommodated whether the practice uses an alphabetic, numeric or RCGP filing system.

Patients are identified either by account number or name and there are facilities for storing the next appointment date and time, the last appointment date, Medicare or file number, type of health insurance cover, charge type and account owing.

After a consultation, an invoice can be prepared on the spot with provision for payment by either cash, cheque or Bankcard.

As a by-product of this input, transaction statistics by charge type, transaction type, item number and date can be produced. A complete audit log report can be generated at the end of the day.

A deposit slip can then be produced for lodgement with a bank, or if the practice is an associateship, a separate bank deposit slip can be produced for each doctor.

The Hi-Med package has full editing facilities that enable the user to alter the information on patients, items and fees, if required.

Reports can be generated listing fee totals, doctor totals or patient details. As a safeguard there are two levels of password protection in the system to prevent unauthorised access.

Fees are identifided by the item code commonly used and totals accrued for each item number by both quantity and value, with provision for both month-to-date and year-to-date totals on both.

For statistical purposes, the previous year's quantities and values are stored for each file.

The Hi-Med package, developed by HiSoft, is endorsed and promoted by the Australian Medical Association.

Under the terms of this endorsement, the secretaries of the Victorian and NSW branches of the AMA are to jointly establish a product evaluation and development committee to research and analyse computer-based practice management requirements for the medical profession.

AUTHORS OF THE REPORT

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